CCS 308: RESEARCH METHODS TECHNICAL WRITING

1.0 INTRODUCTION

1.1. DEFINITION OF RESEARCH

The origin of the word research is a French word "rechercher", meaning, "to look for again." The word is composed of "re" which in the French language means "again" and then "chercher", "to look for."

The whole idea was borne out of the fact that when someone is searching for something, it is expected that he has an idea, however faint or clear, about what to do to find that thing; where to find that thing and how to go about looking for and finding it. With these requirements fulfilled, the person may or may not achieve his aim of finding what he set out looking for depending on a number of other critical reasons.

Question: What does he do if he fails?

In the words of **Durotolu {2003)** if he fails, he begins to re - examine his initial ideas, which were nothing but assumptions about where his object was supposed to be found, what he thought should be done to find it and when he thought it could be found. He then considers several alternatives to these assumptions and after making up his mind over such new ideas, he starts yet another search. That is, he starts to search again; thus, the term research simply implies looking for something again in other alternative places; putting up 'new' efforts, and taking nothing for granted.

This thus formed the basis for the many definitions of the term research as given in so many authoritative works. For instance,

Research - the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon with which we are concerned or interested [Leedy P.D., 1997]

Bush and Harter {1980} defined it quite simply but broadly as **"the systematic quest for knowledge".**

Adetoro {1986} took the methodology approach in defining research as **"a process of discovery that must follow certain rules of conducting investigations and which is generally based on scientific enquiry where available facts are closely examined or investigated."**

Osuola {1993} considered the term simply as "**the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis, and interpretation of data".**

Drew {1993) viewed it as "**a systematic way of asking questions, a systematic method of inquiry."**

Leedy {1993} the term research is **"the manner in which we attempt to solve problems others have presumably solved".**

Lawal {1995} in his approach the term was conceptualised from the point of view of the various stages involved; as **"identifying a problem, stating the purpose, collecting and analysing valid data, and drawing valid conclusion."**

Best and Kahn {1998} took a more comprehensive approach in their own definition of research as the **"systematic and objective analysis and recording of controlled observations that may lead to the development of generalisations, principles, theories resulting in prediction and ultimate control of many events that may be consequences or causes of specific activities."**

Onyere and Anunmu {2001} took a result- oriented approach in defining research as "**a process of finding out a solution or answer to problems."** They explained further that it is a planning process towards seeking and getting desirable information leading to the provision of plausible answers to reasonable questions. This is with a view to enabling people predict future occurrences and carrying out systematic investigations to solve problems.

Odediran {2001}, research **is "a science of knowledge through investigation that is concerned with systematic way of finding information on an issue, subject or object."**

Deduction

Issa {2003} deducting from the wide range of opinions as contained in the definitions above, concluded that the followings are considered as central to the idea of a research: -

i. A process which is systematic and organized rather than haphazard.
ii. The existence and proper definition of a problem to be investigated.
iii. Collection, analysis and interpretation of relevant data towards arriving at solutions to problems.
iv. Generalising outcome of findings towards better handling of similar event (s) in the future .

Summary:

Research is, thus, an original contribution to the existing stock of knowledge making for its advancement. It is the pursuit of truth with the help of study, observation, comparison and experiment. In short, research is the search for knowledge through objective and systematic method of finding solution to a problem. The systematic approach concerning generalization and the formulation of a theory is also research.

As such the term 'research' refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solution(s) towards the concerned problem or in certain generalizations for some theoretical formulation.

In an academic context, research is used to refer to the activity of a diligent and systematic inquiry or investigation in an area, with the objective of discovering or revising facts, theories, applications etc. The goal is to discover and disseminate new knowledge.

1.2 Research Methodology

Definition - a study of methods of research.

Note that research is a process through which we attempt to achieve systematically and with the support of data the answer to a question, the resolution of a problem, or a greater understanding of a phenomenon. This **process which is called research methodology** has eight distinct characteristics:

1. Research originates with a question or problem.

   The world is filled with unanswered questions, unresolved problems. The problem and its statement are important because they are both the point of origin of formal research.

2. Research requires a clear articulation of a goal.

   A clear, unambiguous statement of problem is critical. The researcher has to state what precisely he/she intends to do.

3. Research requires a specific plan of procedure.

   The overall research effort must be explicitly planned and logically designed. Researchers plan their overall research design and specific research methods in a purposeful way - i.e. to yield data relevant to their particular research problem.

   Note that depending on the specific research question, different designs and methods will be less appropriate.

4. Research usually divides the principal problem into more manageable subproblems.

   The whole is composed of the sum of its parts. It is expedient from the design point of view to reduce the main problem to a series of logical subproblems that when resolved will resolve the main problem.

5. Research is guided by the specific research problem, question or hypothesis.

   Having stated the problem and attendant subproblems, each subproblem is then viewed through a construct of called a hypothesis. Hypothesizing is

attempting to account for the cause of the happening by constructing a series of reasonable guesses.

Note that hypotheses are never proved nor disapproved; they are either supported or not supported (rejected). After the hypothesis comes information (data). The data is either supports or fail to support hypotheses. Many of greatest discoveries in science have begun as hypotheses - called theories by scientists.

6. Research accepts certain critical assumptions.

   An assumption (self-evident truth) is a condition that is taken for granted, without which the research situation would be impossible.

7. Research requires the collection and interpretation of data in attempting to resolve the problem that initiated the research.

   Having isolated the problem, divided it into appropriate subproblems, posited reasonable questions or hypotheses, and reorganized the assumptions that are basic to the entire effort, the next step is to collect whatever data seem appropriate and to organize them in meaningful ways so that they can be interpreted. Interpretation of the data according to Leedy Paul D. (1997), is a sudden, enlightening awareness of what the data mean and unless there is a discovery of the meaning of the data, there is no research.

   Note that data demand interpretation as data, events, happenings, and observations are themselves only data, events, happenings and observations-nothing more. However, they are all potentially meaningful. But no rule, no formula, will lead the researcher unerringly to the correct interpretation. Interpretation is subjective: it depends entirely on the logical mind, inductive reasoning skill, and objectivity of the researcher.

8. Research is by, its nature cyclical: or more exactly, helical.

   Note that genuine research creates more problems than it resolves. Such is the nature of the discovery of knowledge.

   The core concept underlying all research is its methodology

TYPES AND METHODS OF RESEARCH

Question: Is there any difference between types and methods of research?

Types of research refer to the nature of research while

Methods of research are concerned with the process of carrying

out the investigation.

TYPES OF RESEARCH

Research can be classified from three perspectives:

1. Application of research study
2. Objectives in undertaking the research
3. Inquiry mode employed

1. Application:

From the point of view of application, there are two broad categories of research:

- **Pure, basic or fundamental research and**
- **Applied research.**

Pure Research

Pure research involves developing and testing theories and hypotheses that are intellectually challenging to the researcher but may or may not have practical application at the present time or in the future. **The knowledge produced through pure research is sought in order to add to the existing body of research methods**. It is concerned with the process by which the present frontiers of knowledge are expanded so that people could gain a better understanding of their environment.

Its primary goal is to provide useful information, for future application thereby contributing meaningfully to the existing body of knowledge in a particular discipline. Usually, Basic Research is **associated with producing generalizations and principles as well as development and refinement of theories**.

Applied Research

Unlike the Basic Research, Applied Research is concerned with finding solutions to practical problems with an immediate effect. **The main goal of Applied**

Research is to improve a process or a product; since its target is finding solution(s) to the problem at hand; hence its immediate problem- solving goal.

Both basic and applied research use sampling techniques and make inferences about target population. **It sets to improve a product or a process by testing concepts in actual problem situations**. A special type of applied research is known as Action *Research* whose **primary objective is to find solutions to localized day-to-day problems.**

Applied research is done to solve specific, practical questions; for policy formulation, administration and understanding of a phenomenon. It can be exploratory, but is usually descriptive. It is almost always done on the basis of basic research. Applied research can be carried out by **academic or industrial institutions.** Often, an academic institution such as a university will have a specific applied research program funded by an industrial partner interested in that program.

Under these two broad headings, types of research can also be classified into quantitative *and qualitative* as well as conceptual *and empirical*.

Choosing qualitative or quantitative research methodologies

Your research will dictate the kinds of research methodologies you use to underpin your work and methods you use in order to collect data. If you wish to collect quantitative data you are probably measuring variables and verifying existing theories or hypotheses or questioning them. **Data is often used to generate new hypotheses based on the results of data collected about different variables**. One's colleagues are often much happier about the ability to verify quantitative data as many people feel safe only with numbers and statistics.

However, often collections of statistics and number crunching are not the answer to understanding meanings, beliefs and experience, which are better understood through qualitative data. It must be remembered that quantitative data are also collected in accordance with certain research vehicles and underlying research questions. **Even the production of numbers is guided by the kinds of questions asked of the subjects, so is essentially subjective, although it appears less so than qualitative research data.**

Quantitative research- also known as traditional, positivist, experimental, or empiricist as advanced by Comte, Mill, Durkein, Newton, Locke.

Any research involving the use of measurements (at both interval and ratio levels) in the collection of data is called quantitative**. It formulates and tests hypotheses so as to arrive at statements of theory. Its data must be measurable and can be collected through non-participant observations, questionnaire and documents.**

Quantitative research methods:

- Questionnaires

Questionnaires often seem a logical and easy option as a way of collecting information from people. They are actually rather difficult to design and because of the frequency of their use in all contexts in the modern world, the response rate is nearly always going to be a problem (low) unless you have ways of making people complete them and hand them in on the spot (and this of course limits your sample, how long the questionnaire can be and the kinds of questions asked). As with interviews, you can decide to use closed or open questions, and can also offer respondents multiple choice questions from which to choose the statement which most nearly describes their response to a statement or item. Their layout is an art form in itself because in poorly laid out questionnaires respondents tend, for example, to repeat their ticking of boxes in the same pattern. If given a choice of response on a scale 1-5, they will usually opt for the middle point, and often tend to miss out subsections to questions. You need to take expert advice in setting up a questionnaire, ensure that all the information about the respondents which you need is included and filled in, and ensure that you actually get them returned. Expecting people to pay to return postal questionnaires is sheer folly, and drawing up a really lengthy questionnaire will also inhibit response rates. **You will need to ensure that questions are clear, and that you have reliable ways of collecting and managing the data**. Setting up a questionnaire that can be read by an optical mark reader is an excellent idea if you wish to collect large numbers of responses and analyse them statistically rather than reading each questionnaire and entering data manually.

You would find it useful to consult the range of full and excellent research books available. These will deal in much greater depth with the reasons for, processes of holding, and processes of analyzing data from the variety of research methods available to you.

Developing and using a questionnaire - some tips

- Identify your research questions
- Identify your sample
- Draw up a list of appropriate questions and try them out with a colleague
- Pilot them
- Ensure questions are well laid out and it is clear how to 'score them' (tick, circle, delete)
- Ensure questions are not leading and confusing
- Code up the questionnaire so you can analyse it afterwards
- Gain permission to use questionnaires from your sample

- Ensure they put their names or numbers on so you can identify them but keep real names confidential
- Hand them out/post them with reply paid envelopes
- Ensure you collect in as many as possible
- Follow up if you get a small return
- Analyse statistically if possible and / or thematically

Qualitative research - also known as constructivist, naturalistic, interpretive, post positivist or postmodern perspective as advanced by Dethey, Kent, Wittgenstein (latter), Foucault, Miles and Huberman.

On the contrary, **observation technique and in-depth interviews are two main data collection methods employed by qualitative research.** It is carried out in its natural setting; which accounts for why it is more or less presented in a narrative form devoid of any quantitative measurement.

Qualitative research

This is carried out when we wish to understand meanings, look at, describe and understand experience, ideas, beliefs and values, intangibles such as these. *Example*: an area of study that would benefit from qualitative research would be that of students' learning styles and approaches to study, which are described and understood subjectively by students.

Qualitative research methods

- Interview

Interviews enable face to face discussion with human subjects. If you are going to use interviews you will have to decide whether you will take notes (distracting), tape the interview (accurate but time consuming) rely on your memory (foolish) or write in their answers (can lead to closed questioning for time's sake). If you decide to interview you will need to draw up an interview schedule of questions which can be either *closed* or *open* questions, or a mixture of these. Closed questions tend to be used for asking for and receiving answers about fixed facts such as name, numbers, and so on. They do not require speculation and they tend to produce short answers. With closed questions you could even give your interviewees a small selection of possible answers from which to choose. If you do this you will be able to manage the data and quantify the responses quite easily. **The Household Survey and Census ask closed questions, and often market researchers who stop you in the street do too**. You might ask them to indicate how true for them a certain statement was felt to be, and this too can provide both a closed response, and one which can be quantified (30% of those asked said they never ate rice, while 45% said they did so regularly at least once a week... and so on).

The problem with closed questions is that they limit the response the interviewee can give and do not enable them to think deeply or test their real feelings or values.

If you ask open questions such as ‘what do you think about the increase in traffic?’ you could elicit an almost endless number of responses. This would give you a very good idea of the variety of ideas and feelings people have, it would enable them to think and talk for longer and so show their feelings and views more fully. But it is very difficult to quantify these results. You will find that you will need to read all the comments through and to categorise them after you have received them, or merely report them in their diversity and make general statements, or pick out particular comments if they seem to fit your purpose. If you decide to use interviews:

- Identify your sample.
- Draw up a set of questions that seem appropriate to what you need to find out.
- Do start with some basic closed questions (name etc.).
- Don't ask leading questions.
- Try them out with a colleague.
- Pilot them, then refine the questions so that they are genuinely engaged with your research object.
- Contact your interviewees and ask permission, explain the interview and its use.
- Carry out interviews and keep notes/tape.
- Transcribe.
- Thematically analyse results and relate these findings to others from your other research methods.

Conceptual research

In the case of a conceptual research, its goals are directed to developing new concepts or reinterpreting existing ones in an abstract form; involving the use of logic, reasoning, intelligent and intuition.

Empirical research

On its own part, empirical research is concerned with the collection of verifiable data which would produce the same results should another researcher carry out the same study under the same conditions elsewhere. **It formulates and tests hypothesis while its factual outcomes are external to the researcher since those outcomes would have been derived from the experiments already carried out**.

2. Objectives:

From the viewpoint of objectives, a research can be classified as

- *descriptive*
- *correlational*
- *explanatory*
- *exploratory*

Descriptive research attempts to describe systematically a situation, problem, phenomenon, service or programme, or provides information about, say, living condition of a community, or describes attitudes towards an issue.

Correlational research attempts to discover or establish the existence of a relationship / interdependence between two or more aspects of a situation.

Explanatory research attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomenon.

Exploratory research is undertaken to explore an area where little is known or to investigate the possibilities of undertaking a particular research study (feasibility study / pilot study).

In practice most studies are a combination of the first three categories.

3. Inquiry Mode:

From the process adopted to find answer to research questions – the two approaches are:

- *Structured approach*
- *Unstructured approach*

Structured approach:
The structured approach to inquiry is usually **classified as quantitative research**. Here everything that forms the research process- objectives, design, sample, and the questions that you plan to ask of respondents- is **predetermined**. It is more appropriate to determine the extent of a problem, issue or phenomenon by quantifying the variation, e.g., how many people have a particular problem? How many people hold a particular attitude?

Unstructured approach:
The unstructured approach to inquiry is usually **classified as qualitative research**. This approach allows flexibility in all aspects of the research process. It is more appropriate to explore the nature of a problem, issue or phenomenon without quantifying it.
Main objective is to describe the variation in a phenomenon, situation or attitude, e.g., description of an observed situation, the historical enumeration of events, an account of different opinions different people have about an issue, description of working condition in a particular industry.

Both approaches have their place in research. Both have their strengths and weaknesses. In many studies you have to **combine both qualitative and quantitative approaches.** For example, suppose you have to find the types of cuisine / accommodation available in a city and the extent of their popularity.
Types of cuisine is the qualitative aspect of the study as finding out about them entails description of the culture and cuisine.
The **extent of their popularity is the quantitative** aspect as it involves estimating the number of people who visit restaurant serving such cuisine and calculating the other indicators that reflect the extent of popularity.

Comparisons

(i) ***Applied vs. Fundamental:*** *Research can either be applied (or action) research or "Gathering knowledge for knowledge's sake is termed 'pure' or 'basic' research." Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research. Similarly, research studies, concerning human behaviour carried on with a view to make generalizations about human behaviour, fundamental (to basic or pure) research.* ***Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization, whereas fundamental research is mainly concerned with generalizations and with the formulation of a theory****.*

Thus, the central aim of applied research is to discover a solution for some pressing practical problem, whereas basic research is directed towards finding information that has a broad base of applications and thus, adds to the already existing organized body of scientific knowledge.

(ii) ***Quantitative vs. Qualitative****: Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind.*

For instance, when we are interested in investigating the reasons for human behaviour (i.e., why people think or do certain things), we quite often talk of 'Motivation Research', an important type of qualitative research. This type of research aims at discovering the underlying motives and desires, using in depth interviews for the purpose. Other techniques of such research are word association tests, sentence completion tests, story completion tests and similar other projective

techniques. Attitude or opinion research i.e., research designed to find out how people feel or what they think about a particular subject or institution is also qualitative research.

Qualitative research is specially important in the behavioural sciences where the aim is to discover the underlying motives of human behaviour. Through such research we can analyse the various factors which motivate people to behave in a particular manner or which make people like or dislike a particular thing. It may be stated, however, that to apply qualitative research in practice is relatively a difficult job and therefore, while doing such research, one should seek guidance from experimental psychologists.

(iii) Conceptual vs. Empirical: Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones. On the other hand, empirical research relies on experience or observation alone, often without due regard for system and theory. It is data-based research, coming up with conclusions which are capable of being verified by observation or experiment.

We can also call it as experimental type of research. In such a research it is necessary to get at facts firsthand, at their source, and actively to go about doing certain things to stimulate the production of desired information. In such a research, the researcher must first provide himself with ***a working hypothesis or guess as to the probable results.*** *He then works to get enough facts (data) to prove or disprove his hypothesis. He then sets up experimental designs which he thinks will manipulate the persons or the materials concerned so as to bring forth the desired information. Such research is thus characterized by the experimenter's control over the variables under study and his deliberate manipulation of one of them to study its effects. Empirical research is* ***appropriate when proof is sought*** *that certain variables affect other variables in some way. Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a given hypothesis.*

(iv) Descriptive vs. Analytical: Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. In social science and business research we quite often use Research Methodology: An Introduction to the term Ex post facto research for descriptive research studies. The main characteristic of this

method is that the researcher has no control over the variables; he can only report what has happened or what is happening. Most ex post facto research projects are used for descriptive studies in which the researcher seeks to measure such items as, for example, frequency of shopping, preferences of people, or similar data. Ex post facto studies also include attempts by researchers to discover causes even when they cannot control the variables. The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlational methods. In analytical research, on the other hand, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

(v) Some Other Types of Research: All other types of research are variations of one or more of the above stated approaches, based on either the purpose of research, or the time required to accomplish research, or the environment in which research is done, or on the basis of some other similar factors.

From the point of view of time, we can think of research either as one-time research or longitudinal research. In the former case the research is confined to a single time-period, whereas in the latter case the research is carried on over several time-periods. Research can be field-setting research or laboratory research or simulation research, depending upon the environment in which it is to be carried out. Research can as well be understood as clinical or diagnostic research. Such research follow case-study methods or in-depth approaches to reach the basic causal relations. Such studies usually go deep into the causes of things or events that interest us, using very small samples and very deep probing data gathering devices. The research may be exploratory or it may be formalized. The objective of exploratory research is the development of hypotheses rather than their testing, whereas formalized research studies are those with substantial structure and with specific hypotheses to be tested. Historical research is that which utilizes historical sources like documents, remains, etc. to study events or ideas of the past, including the philosophy of persons and groups at any remote point of time.

Research can also be classified as conclusion-oriented or decision-oriented. While doing conclusion-oriented research, a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes. Decision-oriented research is always for the need of a decision maker and the researcher in this case is not free to embark upon research according to his own inclination. Operations research is an example of decision oriented-research since

it is a scientific method of providing executive departments with a quantitative basis for decisions regarding operations under their control.

SIGNIFICANCE OF RESEARCH

"*All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention*" is a famous Hudson Maxim in context of which the significance of research can well be understood. Increased amounts of research make progress possible.

Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organization.

[The role of research in several fields of applied economics, whether related to business or to the economy as a whole, has greatly increased in modern times. The increasingly complex nature of business and government has focused attention on the use of research in solving operational problems. Research, as an aid to economic policy, has gained added importance, both for government and business.

Research provides the basis for nearly all government policies in our economic system. For instance, government's budgets rest in part on an analysis of the needs and desires of the people and on the availability of revenues to meet these needs. The cost of needs has to be equated to probable revenues and this is a field where research is most needed. Through research we can devise alternative policies and can as well examine the consequences of each of these alternatives.

Decision-making may not be a part of research, but research certainly facilitates the decisions of the policy maker. Government has also to chalk out programmes for dealing with all facets of the country's existence and most of these will be related directly or indirectly to economic conditions. The plight of cultivators, the problems of big and small business and industry, working conditions, trade union activities, the problems of distribution, even the size and nature of defence services are matters requiring research. Thus, research is considered necessary with regard to the allocation of nation's resources. Another area in government, where research is necessary, is collecting information on the economic and social structure of the nation. Such information indicates what is happening in the economy and what changes are taking place. Collecting such statistical information is by no means a routine task, but it involves a variety of research problems. These day nearly all

governments maintain large staff of research technicians or experts to carry on this work.

Thus, in the context of government, research as a tool to economic policy has three distinct phases of operation, viz.
(i) Investigation of economic structure through continual compilation of facts;

(ii) Diagnosis of events that are taking place and the analysis of the forces underlying them; and

(iii) The prognosis, i.e., the prediction of future developments.
Research has its special significance in solving various operational and planning problems of business and industry. Operations research and market research, along with motivational research, are considered crucial and their results assist, in more than one way, in taking business decisions.

Market research is the investigation of the structure and development of a market for the purpose of formulating efficient policies for purchasing, production and sales. Operations research refers to the application of mathematical, logical and analytical techniques to the solution of business problems of cost minimisation or of profit maximisation or what can be termed as optimisation problems. Motivational research of determining why people behave as they do is mainly concerned with market characteristics. In other words, it is concerned with the determination of motivations underlying the consumer (market) behaviour. All these are of great help to people in business and industry who are responsible for taking business decisions. Research with regard to demand and market factors has great utility in business. Given knowledge of future demand, it is generally not difficult for a firm, or for an industry to adjust its supply schedule within the limits of its projected capacity. Market analysis has become an integral tool of business policy these days. Business budgeting, which ultimately results in a projected profit and loss account, is based mainly on sales estimates which in turn depends on business research. Once sales forecasting is done, efficient production and investment programmes can be set up around which are grouped the purchasing and financing plans. Research, thus, replaces intuitive business decisions by more logical and scientific decisions.

Research is equally important for social scientists in studying social relationships and in seeking answers to various social problems. It provides the intellectual satisfaction of knowing a few things just for the sake of knowledge and also has practical utility for the social scientist to know for the sake of being able to do something better or in a more efficient manner. Research in social sciences is concerned both with knowledge for its own sake and with knowledge for what it can

contribute to practical concerns. "This double emphasis is perhaps especially appropriate in the case of social science. On the one hand, its responsibility as a science is to develop a body of principles that make possible the understanding and prediction of the whole range of human interactions. On the other hand, because of its social orientation, it is increasingly being looked to for practical guidance in solving immediate problems of human relations."]

In addition to what has been stated above, the significance of research can also be understood keeping in view the following points:

(a) To those students who are to write a master's or Ph.D. thesis, research may mean a careerism or a way to attain a high position in the social structure;

(b) To professionals in research methodology, research may mean a source of livelihood;

(c) To philosophers and thinkers, research may mean the outlet for new ideas and insights;

(d) To literary men and women, research may mean the development of new styles and creative work;

(e) To analysts and intellectuals, research may mean the generalizations of new theories.

Thus, research is the fountain of knowledge for the sake of knowledge and an important source of providing guidelines for solving different business, governmental and social problems. It is a sort of formal training which enables one to understand the new developments in one's field in a better way.

METHODS OF RESEARCH

There are several Research methods used by researchers in the conduct of research. It is important to note that there is no hard and just rule regarding the kind of research method to be adopted in any given research situation. Instead, the choice of a particular research method is strictly a function of the nature of the problem being investigated. In other words, the appropriateness of a given research method is determined mainly by the kind of investigation being conducted. This, in turn, determines the kind of data that will be generated in the course of the research. Some

of the commonly used research methods, according to Aina (2002), include the following namely:

a. Social Survey Research.
b. Historical Research.
c. Case Studies Research.
d. Delphi Studies Research.
e. Bibliometric Research.
f. Citation Analysis Research.
g. Experimental Research.

(a) Social Survey Research Method

This method is commonly referred to as Survey or Descriptive Research. It is the method associated with research situations, where the research subjects run into hundreds or even thousands, spreading across a large area. Its underlying principle is to seek the opinions of individuals on a particular problem, whereby the consensus of these opinions provides the needed solution to the problem at hand.

One of its main characteristics is that of selecting a sample from a population, due to the sheer inability of the researcher to reach every member of the population as a result of their member and spread. With a carefully selected sample, the results obtained from the sample will be used to generalize the population. There is the choice, therefore, to obtain information from a sample population without necessarily seeking the opinions of the whole population.

The one condition which must, however, be fulfilled here is ensuring that the selected sample is not only *unbiased but also representative*. Hence, the use of sampling techniques to determine the appropriateness of the sample. Thus, the *questionnaire, interview and observation* are often used as data collection instruments to obtain the opinions from the sample in a survey research.

(b) Historical Research

Considering the Greek word *historia*, which means, "*searching to find out*", historical research method is an inquiry into the past. Its aim is essentially to interpret past trends of attitudes, events and facts. In other words, it is targeted at gathering information about events of the past, personalities involved and the developments that have taken place. To this end, data would be collected mainly from the primary sources, which may include manuscripts, annual reports, and gazettes. In addition, the researcher

arranges for interviews with personalities who are involved in or witnessed the developments. Sometimes, data have to be collected from secondary sources also. Historical sources may also be classified into two main categories namely: -

i. Documents, and
ii. Relics.

Whereas *documents are usually written*, *relics are archaeological or geological remains like tools, utensils, equipment and implements*.

Documentary sources would include: -

i. Official Records, Minutes of Meetings, Committee Reports and legal Documents.
ii. Institutional Records, Attendance Rolls and Bulletins.
iii. Memoirs, Biographies, Diaries and Personal Letters.

Memoir, autobiography, biography

A memoir is a special kind of autobiography, usually involving a public portion of the author's life as it relates to a person, historic event, or thing. The text is about the personal knowledge and/or experiences of the author.

In contrast, an autobiography covers the author's entire life to the present, and is expected to include details about his or her public and private life. A biography is someone's life story written by another person.

(c) Case Studies

This method is used to study a particular case in point with a view to examining in great depth and extent, the characteristics of that individual unit. What is considered as a unit of a Case Study will vary from one study to another. It can be an individual person, a family, an institution or even an entire community. This is the case with some case studies where emphasis is on pattern and sequences of growth and/or change as a function of time. This is why such studies are referred to as Developmental Case Studies. In any case, the critical issue about case studies is that all variables connected with the unit (internal and external), have to be thoroughly identified and evaluated. The ultimate goal here is to gather comprehensive information about that unit being studied. Some of the instruments used in collecting data for case studies include observations, questionnaires, interviews and documentary sources.

(d) Delphi Studies

This is a method of research, which Busha and Harter {1980} described as "a systematic approach to the generation of some consensus opinions among a group of carefully selected and anonymous respondents". Using this method, the researcher sets out to collect his data from a list of selected experts on his field of study. Every member of the expert group chosen will be expected to compile a list of opinions on the topic of research.

Once collected, all the responses would be synthesized into a form of questionnaire, which would in turn be made available to the experts for ranking. The data that the ranking process produces are subjected to statistical analysis. The new revised ranking will be incorporated into another questionnaire and made available again to the same set of chosen experts, who did the initial ranking. This process is further repeated until the researcher is able to present a consensus opinion of the experts.

(e) Bibliometrics

This method of research applies mainly to research in the Library and Information Science profession. It involves the statistical analysis of any list such as bibliographies, inter-library loan enquiries and reference enquiries. The popular **Bradford's Law of Scattering** is usually applied as it enables the researcher to obtain the core area of a particular endeavour. Essentially, the Bradford's Law states that: -If scientific journals are arranged in order of descending productivity of articles on a given subject, they may be divided into nucleus of periodicals more particularly devoted to the subject and several other groups of zones contain the same member of articles as the nucleus.

The method is quite popular among libraries in this part of the world mainly because it allows for the ranking of journals that are in regular use in libraries. Similarly, one can compile a list of journals in which staff members regularly publish their papers and then rank them. This can be done from a list of publications of staff of a university. One can also identity books commonly borrowed through inter-library loans, which the library can later acquire for its users. This can be done from inter-library loans. The outcome of this kind of study helps the library to decide on what copies of any particular material found to be regularly used or borrowed in the library are to be procured.

(f) *Citation Analysis*

This is also common in the field of Library and Information Science like the Bibliometrics. In this method, cited references in selected journals are statistically analysed so as to find out the common journals cited by researchers in a particular discipline. The method is so similar to Bibliometric studies so much that it is even assumed to be a part of it.

(g) *Experimental Research*

This is the most popular and perhaps the oldest form of research methods. It is a very predominant method of research in the pure and applied sciences. In this kind of research, we deliberately control and manipulate the conditions, which we have reason to believe determine the area in which we are interested. In other words independent variables are manipulated so as to watch the effects of this on the dependent variables. The thrust of experimental research design is therefore to establish causality (that one factor can cause effect on another factor). Experimental research takes place in the laboratory because it aims at finding out the relationship existing between two factors under controlled conditions.

Usually, there are two groups in this kind of research namely:

i. The experimental group and,
ii. The control group.

Whereas the former is the group under manipulation, the latter is not. As the researcher exposes the experimental group to one or more treatment conditions, he is able to measure the effect, compared to the control group, which is not exposed to the same treatment(s). Thus, the experimental research strictly adopts the Scientific Method in its investigation. Essentially, this method involves the following process namely:

i. Observation/problem statement.
ii. Formulation of hypotheses/theory.
iii. Testing.
iv. Conclusion.

Summary on Research Approaches (Methods)

The above description of the types of research brings to light the fact that there are two basic approaches to research, viz., quantitative approach and the qualitative approach. The former involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. This approach can be further sub-classified into inferential, experimental and simulation approaches to research. The purpose of inferential approach to research is to form a

data base from which to infer characteristics or relationships of population. This usually means survey research where a sample of population is studied (questioned or observed) to determine its characteristics, and it is then inferred that the population has the same characteristics.

Experimental approach is characterised by much greater control over the research environment and in this case some variables are manipulated to observe their effect on other variables.

Simulation approach involves the construction of an artificial environment within which relevant information and data can be generated. This permits an observation of the dynamic behaviour of a system (or its sub-system) under controlled conditions. The term 'simulation' in the context of business and social sciences applications refers to "the operation of a numerical model that represents the structure of a dynamic process. Given the values of initial conditions, parameters and exogenous variables, a simulation is run to represent the behaviour of the process over time." Simulation approach can also be useful in building models for understanding future conditions.

Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behaviour. Research in such a situation is a function of researcher's insights and impressions. Such an approach to research generates results either in non-quantitative form or in the form which are not subjected to rigorous quantitative analysis. Generally, the techniques of focus group interviews, projective techniques and depth interviews are used.

ASSIGNMENT:

1. Research quality and planning (research process)
2. Honesty and ethics and intellectual property rights
3. Computer-based research facilities

Ethics

Science is built on trust. Ethics deserves our attentions.
Published research:

- Should be: new, objective, and fair.
- Shouldn't: present opinion as fact, distort truths, and plagiarize others.

The forms of unethical behaviors:

Plagiarism - the widely acknowledged, unethical and criminal practice in research. This is an offence bordering on copyright infringements where a researcher fails to acknowledge the intellectual properties of others he had used in the course of his own study.

Thus, using others' intellectual properties is not the offence here; rather, it is the lack of acknowledging the fact that what was used actually belongs to others. The act of referencing simply provides for this much-desired acknowledgment. This applies not only in project writing but in all cases of technical reporting and writings; such that it forms a part of the criteria for judging the quality of such works; hence, its significance.

Fraud: fake experiment results.

Abuse of power: misuse of privileges bestowed by the office to gain an advantage or deny others their rights.

Research Methods versus Methodology

It seems appropriate at this juncture to explain the difference between research methods and research methodology. Research methods may be understood as all those methods/techniques that are used for conduction of research. Research methods or techniques thus, refer to the methods the researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods.

Classification of research methods

Question: What is the object of research?

Since the object of research, particularly the applied research, is to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible. Keeping this in view, research methods can be put into the following three groups:

1. **In the first group** we include those methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;

2. **The second group** consists of those statistical techniques which are used for establishing relationships between the data and the unknowns;

3. **The third group** consists of those methods which are used to evaluate the accuracy of the results obtained.

Research methods falling in the above stated last two groups are generally taken as the analytical tools of research.

Distinction between research methods and research techniques:

Note. At times, a distinction is also made between research techniques and research methods. *Research techniques refer to the behaviour and instruments used in performing research operations such as making observations, recording data, techniques of processing data and the like. Research methods refer to the behaviour and instruments used in selecting and constructing research techniques*. For instance, the difference between methods and techniques of data collection can better be understood from the details given in the following chart—

Type	Methods	Techniques
1. Library Research	(i) Analysis of historical records	Recording of notes Content analysis, Tape and Film listening and analysis
	(ii) Analysis of documents	Statistical compilations and manipulations, reference and abstract guides, contents analysis.
2. Field Research	(i) Non-participant direct observation	Observational behavioural scales, use of score cards, etc.
	(ii)Participant observation	Interactional recording, possible use of tape recorders, photo graphic techniques.

	(iii) Mass observation	Recording mass behaviour, interview using independent observers in public places.
	(iv) Mail questionnaire	Identification of social and economic background of respondents.
	(v) Opinionnaire	Use of attitude scales, projective techniques, use of sociometric scales.
	(vi) Personal interview	Interviewer uses a detailed schedule with open and closed questions.
	(vii) Focused interview	Interviewer focuses attention upon a given experience and its effects.
	(viii) Group interview	Small groups of respondents are interviewed simultaneously.
	(ix) Telephone survey	Used as a survey technique for information and for discerning opinion; may also be used as a follow up of questionnaire.
	(x) Case study and life history	Cross sectional collection of data for intensive analysis, longitudinal collection of data of intensive character.
3. Laboratory	Small group study of random behaviour, play and role analysis	Use of audio-visual recording devices, use of observers, etc.

Note. From what has been stated above, we can say that ***methods are more general. It is the methods that generate techniques***. However, in practice, the two terms are taken as interchangeable and when we talk of research methods we do, by implication, include research techniques within their compass.

Research Methodology

Research methodology ***is a way to systematically solve the research problem***. *It may be understood as* ***a science of studying how research is done scientifically***. *In it we study the various steps* that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology.

In conclusion, we can say ***that research methodology has many dimensions and research methods do constitute a part of the research methodology. The scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others. Why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analysing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.***

Research and Scientific Method

For a clear perception of the term **research**, one should know the meaning of **scientific method**. The two terms, **research and scientific method**, are closely related. Research, as we have already stated, can be termed as ***"an inquiry into the nature of, the reasons for, and the consequences of any particular set of circumstances, whether these circumstances are experimentally controlled or recorded just as they occur. Further, research implies the researcher is interested in more than particular results; he is interested in the repeatability of the results and in their extension to more complicated and general situations."***

On the other hand, the philosophy common to all research methods and techniques, although they may vary considerably from one science to another, is usually given the name of scientific method. In this context, Karl Pearson writes, ***"The scientific method is one and same in the branches (of science) and that method is the method of all logically trained minds … the unity of all sciences consists alone in its methods, not its material; the man who classifies facts of any kind whatever, who sees their mutual relation and describes their sequences, is applying the Scientific Method and is a man of science. Scientific method is the pursuit of truth as determined by logical considerations. The ideal of science is to achieve a systematic interrelation of facts. Scientific method attempts to achieve "this ideal by experimentation, observation, logical arguments from accepted postulates and a combination of these three in varying proportions."***

In scientific method, logic aids in formulating propositions explicitly and accurately so that their possible alternatives become clear.

Further, logic develops the consequences of such alternatives, and when these are compared with observable phenomena, it becomes possible for the researcher or the scientist to state which alternative is most in harmony with the observed facts. All this is done through experimentation and survey investigations which constitute the integral parts of scientific method.

Experimentation is done to test hypotheses and to discover new relationships. If any, among variables. But the conclusions drawn on the basis of experimental data are generally criticized for ***either faulty assumptions, poorly designed experiments, badly executed experiments or faulty interpretations***. As such the researcher must pay all possible attention while developing the experimental design and must state only probable inferences.

The purpose of survey investigations may also be to provide scientifically gathered information to work as a basis for the researchers for their conclusions.

The scientific method is, thus, based on certain basic postulates which can be stated as follows:

i. It relies on empirical evidence;
ii. It utilizes relevant concepts;
iii. It is committed to only objective considerations;
iv. It presupposes ethical neutrality, i.e., it aims at nothing but making only adequate and correct statements about population objects;
v. It results into probabilistic predictions;

vi. Its methodology is made known to all concerned for critical scrutiny are for use in testing the conclusions through replication;
vii. It aims at formulating most general axioms or what can be termed as scientific theories.

Thus, "the scientific method ***encourages a rigorous, impersonal mode of procedure dictated by the demands of logic and objective procedure."***

Accordingly, scientific method implies an ***objective, logical and systematic method***, i.e., *a method free from personal bias or prejudice, a method to ascertain demonstrable qualities of a phenomenon capable of being verified, a method wherein the researcher is guided by the rules of logical reasoning, a method wherein the investigation proceeds in an orderly manner and a method that implies internal consistency*.

Importance of Knowing How Research is Done

Question: How is the research methodology important to you as a student?

The study of research methodology gives the student *the necessary training in gathering material and arranging or card-indexing them, participation in the field work when required, and also training in techniques for the collection of data appropriate to particular problems, in the use of statistics, questionnaires and controlled experimentation and in recording evidence, sorting it out and interpreting it.*
In fact, importance of knowing the methodology of research or how research is done stems from the following considerations:

(i) For one who is preparing himself for a career of carrying out research, the importance of knowing research methodology and research techniques is obvious since the same constitute the tools of his trade. The knowledge of methodology *provides good training especially to the new research worker and enables him to do better research. It helps him to develop disciplined thinking or a 'bent of mind' to observe the field objectively*. Hence, those aspiring for careerism in research must *develop the skill of using research techniques and must thoroughly understand the logic behind them.*

(ii) Knowledge of how to do research will *inculcate the ability to evaluate and use research results with reasonable confidence*. In other words, we can state that the knowledge of research methodology is helpful in various fields such as government or business administration, community development and social work where persons are increasingly called upon to evaluate and use research results for action.

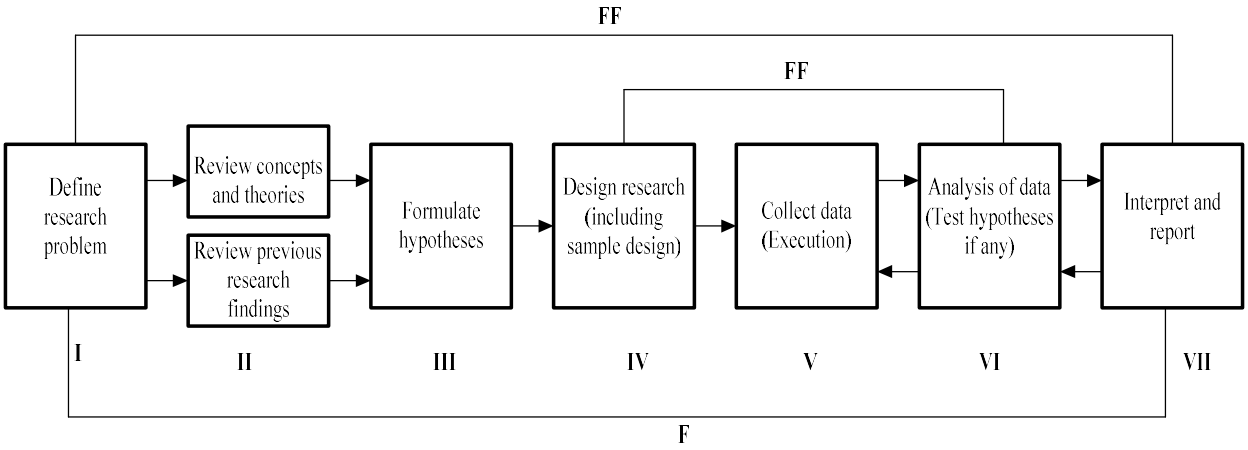
(iii) When one knows how research is done, then one may *have the satisfaction of acquiring a new intellectual tool which can become a way of looking at the world and of judging every day experience.* Accordingly, *it enables us to make intelligent decisions concerning problems facing us in practical life at different points of time.* Thus, the knowledge of research methodology *provides tools to look at things in life objectively.*

(iv) In this scientific age, all of us are in many ways consumers of research results and we can use them intelligently provided we are able to judge the adequacy of the methods by which they have been obtained. The knowledge of methodology *helps the consumer of research results to evaluate them and enables him to take rational decisions*.

Research process

Note: Before embarking on the details of research methodology and techniques, it seems appropriate to present a brief overview of the research process.

Research process consists of *series of actions or steps* necessary to effectively carry out research and the *desired sequencing* of these steps. The chart shown in Figure 1.1 well illustrates a research process.



Where F = Feed back (Helps in controlling of the subsystem to which it's transmitted)

FF = Feed forward (Serves the vital function of providing criteria for evaluation)

Figure 1.1. Research process in flow chart

The chart indicates that the research process consists of a number of closely related activities, as shown through I to VII. *But such activities overlap continuously rather than following a strictly prescribed sequence*. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember *that the various steps involved in a research process are not mutually exclusive; nor are they separate and distinct*. They *do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps*. However, the following order concerning various steps provides a useful procedural guideline regarding the research process:

(1) Formulating the research problem;
(2) Extensive literature survey;
(3) Developing the hypothesis;
(4) Preparing the research design;
(5) Determining sample design;
(6) Collecting the data;
(7) Execution of the project;
(8) Analysis of data;
(9) Hypothesis testing;

(10) Generalizations and interpretation, and
(11) Preparation of the report or presentation of the results, i.e., formal write-up of conclusions reached.

A brief description of the above stated steps will be helpful.

1. Formulating the research problem.

(There are two types of research problems: *those which relate to states of nature and those which relate to relationships between variables)*.

At the very outset the researcher *must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into*. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. *The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry*. Essentially two steps are involved in formulating the research problem: (i) *understanding the problem thoroughly, and (ii) rephrasing the same into meaningful terms from an analytical point of view.*

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind.

Often, *the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms.* In private business units or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions. The researcher *must at the same time examine all available literature to get himself acquainted with the selected problem*. He may review two types of literature—the conceptual literature co*ncerning the concepts and theories*, and the empirical literature *consisting of studies made earlier which are similar to the one proposed*. *The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context.* After this the *researcher rephrases the problem into analytical or operational terms i.e., to put the*

problem in as specific terms as possible. **This task of formulating, or defining, a research problem is a step of greatest importance in the entire research process.** The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the objectivity and validity of the background facts concerning the problem. **Professor W.A. Neiswanger correctly states that *the statement of the objective is of basic importance* because *it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report*.** If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact, *formulation of the problem often follows a sequential pattern where a number of formulations are set up, each formulation more specific than the preceeding one, each one phrased in more analytical terms, and each more realistic in terms of the available data and resources*.

2. Extensive literature survey.

Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. (or Master) degree to write a synopsis *(a brief summary)* of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher *should undertake extensive literature survey connected with the problem*. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. *Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem*. In this process, it should be remembered that *one source will lead to another*. *The earlier studies, if any, which are similar to the study in hand should be carefully studied*. A good library will be a great help to the researcher at this stage.

3. Development of working hypotheses.

After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is *tentative assumption made in order to draw out and test its logical or empirical consequences*. As such the manner in which research hypotheses are developed is particularly important since they *provide the focal point for research*. They also *affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data which is required for the analysis*. In most types of research, the development of working hypothesis

plays an important role. Hypothesis should *be very specific and limited to the piece of research in hand* because it has to be tested. *The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem*. It also *indicates the type of data required and the type of methods of data analysis to be used*. How does one go about developing working hypotheses? The answer is by using the following approach:

(a) Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution;

(b) Examination of data and records, if available, concerning the problem for possible trends, peculiarities and other clues;

(c) Review of similar studies in the area or of the studies on similar problems; and

(d) Exploratory personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem.

Thus, working hypotheses arise as a *result of a-priori thinking about the subject, examination of the available data and material including related studies and the counsel of experts and interested parties.*

Working hypotheses are more useful when stated in *precise and clearly defined terms*. It may as well be remembered that occasionally we may encounter a problem where we do not need working hypotheses, especially in the case of exploratory or formulative researches which do not aim at testing the hypothesis. But as a general rule, specification of working hypotheses in another basic step of the research process in most research problems.

4. Preparing the research design

The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, i.e., he will have to *state the conceptual structure within which research would be conducted*. The preparation of such a design *facilitates research to be as efficient as possible yielding maximal information*. In other words, ***the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money.*** {But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories: (i) Exploration, (ii)

Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimises bias and maximises the reliability of the data collected and analysed.}

(There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs can be either informal designs (such as before-and-after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project).

The preparation of the research design, appropriate for a particular research problem, involves usually the consideration of the following:

(i) The means of obtaining the information;
(ii) The availability and skills of the researcher and his staff (if any);
(iii) Explanation of the way in which selected means of obtaining information will be organized and the reasoning leading to the selection;
(iv) The time available for research; and
(v) The cost factor relating to research, i.e., the finance available for the purpose.

5. Determining sample design

(All the items under consideration in any field of inquiry constitute a 'universe' or 'population' or 'set'. A complete enumeration of all the items in the 'population' is known as a ***census inquiry*.** It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a *great deal of time, money and energy*. Not only this, *census inquiry is not possible in practice under many circumstances*. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. ***The items so selected constitute what is technically called a sample*.)**

The researcher must decide the *way of selecting a sample* or what is popularly known as the sample design. In other words, *a* sample design *is a definite plan determined before any data are actually collected for obtaining a sample from a given population.* Thus, the plan to select 12 of a city's 200 drug stores in a certain way constitutes a sample design. Samples can be *either probability samples or non-probability samples*. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researcher to determine this probability. *Probability samples* are those based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling whereas *non-probability samples* are those based on convenience sampling, judgment sampling and quota sampling techniques. A brief mention of the important sample designs is as follows:

(i) *Deliberate sampling:* *Deliberate sampling is also known as purposive or non-probability sampling*. This sampling method involves purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe. When population elements are selected for inclusion in the sample based on the ease of access, it can be called convenience sampling. If a researcher wishes to secure data from, say, gasoline buyers, he may select a fixed number of petrol stations and may conduct interviews at these stations. This would be an example of convenience sample of gasoline buyers. At times such a procedure may give very biased results particularly when the population is not homogeneous. On the other hand, in judgment sampling the researcher's judgment is used for selecting items which he considers as representative of the population. For example, a judgement sample of college students might be taken to secure reactions to a new method of teaching. Judgement sampling is used quite frequently in qualitative research where the desire happens to be to develop hypotheses rather than to generalise to larger populations.

(ii) *Simple random sampling:* This type of sampling is also known as chance sampling or probability sampling where each and every item in the population has an **equal chance** of inclusion in the sample and each one of the possible samples, in case of finite universe, has the same probability of being selected. {For example, if we have to select a sample of 300 items from a universe of 15,000 items, then we can put the names or numbers of all the 15,000 items on slips of paper and conduct a lottery. Using the random number tables is another method of random sampling. To select the sample, each item is assigned a number from 1 to 15,000. Then, 300 five digit random numbers are selected from the table. To do this we select some random starting point and then a systematic pattern is used in proceeding through the table. We might start in the 4th row, second column and

proceed down the column to the bottom of the table and then move to the top of the next column to the right. When a number exceeds the limit of the numbers in the frame, in our case over 15,000, it is simply passed over and the next number selected that does fall within the relevant range. Since the numbers were placed in the table in a completely random fashion, the resulting sample is random. This procedure gives each item an equal probability of being selected. In case of infinite population, the selection of each item in a random sample is controlled by the same probability and that successive selections are independent of one another.}

(iii) *Systematic sampling.* In some instances the most practical way of sampling is to select every 15th name on a list, every 10th house on one side of a street and so on. Sampling of this type is known as systematic sampling. An element of randomness is usually introduced into this kind of sampling by using random numbers to pick up the unit with which to start. This procedure is useful when sampling frame is available in the form of a list. In such a design the selection process starts by picking some random point in the list and then every nth element is selected until the desired number is secured.

(iv) *Stratified sampling:* If the population from which a sample is to be drawn does not constitute a homogeneous group, then stratified sampling technique is applied so as to obtain a representative sample. In this technique*, the population is stratified into a number of non-overlapping subpopulations or strata and sample items are selected from each stratum.* If the items selected from each stratum is based on simple random sampling the entire procedure, first stratification and then simple random sampling, is known as *stratified random sampling*.

(v) *Quota sampling:* In stratified sampling the cost of taking random samples from individual strata is often *so expensive* that interviewers are *simply given quota to be filled from different strata*, the actual selection of items for sample being left to the interviewer's judgement. This is called quota sampling. The size of the quota for each stratum is generally proportionate to the size of that stratum in the population. Quota sampling is thus an important form of non-probability sampling. Quota samples generally happen to be judgement samples rather than random samples.

(vi) *Cluster sampling and area sampling:* Cluster sampling involves grouping the population and then selecting the groups or the clusters rather than individual elements for inclusion in the sample. Suppose some departmental store wishes to sample its credit card holders. It has issued its cards to 15,000 customers. The sample size is to be kept say 450. For cluster sampling this list of 15,000 card

holders could be formed into 100 clusters of 150 card holders each. Three clusters might then be selected for the sample randomly. The sample size must often be larger than the simple random sample to ensure the same level of accuracy because in cluster sampling procedural potential for order bias and other source of error is usually accentuated. The clustering approach can, however, make the sampling procedure relatively easier and increase the efficiency of field work, especially in the case of personal interviews. Area sampling is quite close to cluster sampling and is often talked about when the total geographical area of interest happens to be big one. Under area sampling we first divide the total area into a number of smaller non-overlapping areas, generally called geographical clusters, then a number of these smaller areas are randomly selected, and all units in these small areas are included in the sample. Area sampling is especially helpful where we do not have the list of the population concerned. It also makes the field interviewing more efficient since interviewer can do many interviews at each location.

(vii) *Multi-stage sampling:* This is a further development of the idea of cluster sampling. This technique is meant for big inquiries extending to a considerably large geographical area like an entire country. Under multi-stage sampling the first stage may be to select large primary sampling units such as states, then districts, then towns and finally certain families within towns. If the technique of random-sampling is applied at all stages, the sampling procedure is described as multi-stage random sampling.

(viii) *Sequential sampling:* This is somewhat a complex sample design where the ultimate size of the sample is not fixed in advance but is determined according to mathematical decisions on the basis of information yielded as survey progresses. This design is usually adopted under acceptance sampling plan in the context of statistical quality control. In practice, several of the methods of sampling described above may well be used in the same study in which case it can be called mixed sampling. It may be pointed out here that normally one should resort to random sampling so that bias can be eliminated and sampling error can be estimated. But purposive sampling is considered desirable when the universe happens to be small and a known characteristic of it is to be studied intensively. Also, **there are conditions under which sample designs other than random sampling may be considered better for reasons like convenience and low costs**. The sample design to be used must be decided by the researcher taking into consideration the nature of the inquiry and other related factors.

6. Collecting the data.

In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of **money costs, time and other resources at the disposal of the researcher**. *Primary data can be collected either through experiment or through survey*. If the researcher conducts an experiment, he observes some quantitative measurements, or the data, with the help of which he examines the truth contained in his hypothesis. But in the case of a survey, data can be collected by any one or more of the following ways:

(i) *By observation:* This method implies the collection of information by way of investigator's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by either the past behaviour or future intentions or attitudes of respondents. This method is no doubt **an expensive method** and the information provided by this method is also **very limited**. As such this method is not suitable in inquiries where large samples are concerned.

(ii) *Through personal interview:* The investigator follows a rigid procedure and seeks answers to a set of pre-conceived questions through personal interviews. This method of collecting data is usually carried out in a structured way where output depends upon the ability of the interviewer to a large extent.

(iii) *Through telephone interviews*: This method of collecting information involves contacting the respondents on telephone itself. This is not a very widely used method but it plays an important role in industrial surveys in developed regions, particularly, when the survey has to be accomplished in a very limited time.

(iv) *By mailing of questionnaires:* The researcher and the respondents do (not) come in contact with each other if this method of survey is adopted. Questionnaires are mailed to the respondents with a request to return after completing the same. It is the most extensively used method in various economic and business surveys. Before applying this method, usually a Pilot Study for testing the questionnaire is conducted which reveals the weaknesses, if any, of the questionnaire. Questionnaire to be used must be prepared very carefully so that it may prove to be effective in collecting the relevant information.

(v) *Through schedules:* Under this method the enumerators are appointed and given training. They are provided with schedules containing relevant questions. These enumerators go to respondents with these schedules. Data are collected by filling up the schedules by enumerators on the basis of replies given by respondents. Much depends upon the capability of enumerators so far as this method is concerned.

Some occasional field checks on the work of the enumerators may ensure sincere work.

The researcher should select one of these methods of collecting the data taking into consideration *the nature of investigation, objective and scope of the inquiry, financial resources, available time and the desired degree of accuracy*. Though he should pay attention to all these factors but much depends upon the ability and experience of the researcher. In this context Dr A.L. Bowley very aptly remarks *that in collection of statistical data common sense is the chief requisite and experience the chief teacher.*

7. Execution of the project.

Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. *The researcher should see that the project is executed in a systematic manner and in time*. (If the survey is to be conducted by means of structured questionnaires, data can be readily machine-processed. In such a situation, questions as well as the possible answers may be coded. If the data are to be collected through interviewers, arrangements should be made for proper selection and training of the interviewers. The training may be given with the help of instruction manuals which explain clearly the job of the interviewers at each step. Occasional field checks should be made to ensure that the interviewers are doing their assigned job sincerely and efficiently. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible. This, **in other words, means that steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy**. If some of the respondents do not cooperate, some suitable methods should be designed to tackle this problem. One method of dealing with the non-response problem is to make a list of the non-respondents and take a small sub-sample of them, and then with the help of experts vigorous efforts can be made for securing response.)

8. Analysis of data.

After the data have been collected, the researcher turns to the task of analysing them. *The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences*. (The unwieldy data should necessarily be condensed into a few manageable groups and tables for further

analysis. Thus, researcher should classify the raw data into some purposeful and usable categories. Coding operation is usually done at this stage through which the categories of data are transformed into symbols that may be tabulated and counted. Editing is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation. Tabulation is a part of the technical procedure wherein the classified data are put in the form of tables. The mechanical devices can be made use of at this juncture). **A great deal of data, especially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously**.

Analysis work after tabulation is generally based on the computation of various percentages, coefficients, etc., by applying various well defined statistical formulae. *In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s)*. (For instance, if there are two samples of weekly wages, each sample being drawn from factories in different parts of the same city, giving two different mean values, then our problem may be whether the two mean values are significantly different or the difference is just a matter of chance. Through the use of statistical tests we can establish whether such a difference is a real one or is the result of random fluctuations. If the difference happens to be real, the inference will be that the two samples come from different universes and if the difference is due to chance, the conclusion would be that the two samples belong to the same universe. Similarly, the technique of analysis of variance can help us in analyzing whether three or more varieties of seeds grown on certain fields yield significantly different results or not. **In brief, the researcher can analyze the collected data with the help of various statistical measures**.)

9. Hypothesis-testing.

After analyzing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing hypotheses. (Various tests, such as *Chi square test, t-test, F-test,* have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry.) *Hypothesis-testing will result in either accepting the hypothesis or in rejecting it*. If the researcher *had no hypotheses to start with, generalizations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.*

10. Generalizations and interpretation.

If a hypothesis is tested and upheld several times, it may be possible for the researcher *to arrive at generalization, i.e., to build a theory*. As a matter of fact, the real value of research lies in its ability to arrive at certain generalizations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

11. Preparation of the report or the thesis.

Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care keeping in view the following:

1. **The layout of the report** should be as follows:

(i) The preliminary pages;

(ii) The main text, and

(iii) The end matter.

In its *preliminary pages* the report should carry *title* and *date* followed by *acknowledgements* and *foreword*. Then there should be *a table of contents* followed by a *list of tables* and *list of graphs and charts*, if any, given in the report.

The *main text* of the report should have the following parts:
(a) *Introduction :* It should *contain a clear statement of the objective of the research and an explanation of the methodology adopted* in accomplishing the research. The *scope of the study* along with *various limitations* should as well be stated in this part.

(b) *Summary of findings*: After introduction there would appear a *statement of findings and recommendations* in non-technical language. If the findings are extensive, they should be summarised.

(c) *Main report:* The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections.

(d) *Conclusion:* Towards the end of the main text, researcher should again *put down the results of his research clearly and precisely*. In fact, it is the final summing up.

At the *end* of the report, appendices should be enlisted in respect of all technical data. Bibliography, i.e., list of books, journals, reports, etc., consulted, should also be given in the end. Index should also be given specially in a published research 'report.

2. Report should be **written in a concise and objective style** in simple language avoiding vague expressions such as ‘it seems,’ ‘there may be’, and the like.

3. Charts and illustrations in the main report should be used only if they present the information **more clearly and forcibly**.

4. Calculated ‘confidence limits’ must be mentioned and the various constraints experienced in conducting research operations may as well be stated.

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RESEARCH PROJECT WRITING

Introduction

Embarking on project-writing is a very serious affair, which cannot deserve any less seriousness in its prosecution. Often times, students are tempted to believe that research project-writing is a haphazard undertaking which you can do anyhow, anywhere and anytime. This is grossly erroneous; as it is a commitment that is largely painstaking; and therefore requires a huge amount of sustainable interest that must survive the entire period of undertaking the project. Recognizing this probably explains why school authorities keep the students on a very low number of courses for registration during the research project semester, to afford them the much-needed ample time and commitment to their project work. Unfortunately, many students see this occasion as an excuse for indulgence thereby misusing the opportunity and benefits intended.

What to Plan for

It is against the above temptation that the student researcher has to plan. He has to plan for a judicious use of time, efforts and resources that would be at his disposal. Otherwise, he will end up going to the library to literally "steal" as it were, other students' past projects, copying from them. When he does that, he will not be helping anybody; including himself; and it can only take a little time for him to realise just that.

The justification for planning could also be found in the common cliché that "if you failed to plan, then you have planned to fail". In planning the writing of the research project therefore, the student researcher is expected to meet up with a basic demand, which is to choose a suitable and researchable project topic. But this may not be as easy and simple as it sounds. This is because, choosing a topic may turn out to be the student's greatest undoing, which may mar his success; depending on his approach to it.

How to Choose a Suitable Research Topic

There are several issues involved in choosing a suitable research topic. Foremost, it is important to know that some people are more sensitive to the existence of research problems than others. This gives them the advantage of being able to choose suitable topics more readily than others could. Beyond this, however, Osuola {1993} identified two major factors involved in this choice making exercise to be experience and creativity.

Experience

The student needs to choose a topic about which he knows something. After all, one expects, logically that only from a clear understanding of the theoretical, empirical and practical aspects of the subject, derived from personal experience and a thorough literature review can a good research problem/topic stem. This is because, once you lack the requisite familiarity with the subject matter, you are almost sure of making a wrong choice afterwards.

Creativity

The second factor, bordering on creativity and other personality attributes are often associated with originality, flexibility, initiative, ingenuity and foresight on the part of the researcher. However, all these attributes are expected to operate within the framework of what is already known, just as familiarity with a given field is said to be conducive to original thinking.

Ingenuity - *the quality of being clever, original and creative*

Creative - *is a phenomenon whereby something new and valuable is created (such as an idea, a joke, an artistic or literary work, a painting or taste)*

Innovation -is the application of better solutions that meet new requirements, unarticulated needs, or existing market needs

Factors to Consider in Choosing a Suitable Research Topic

At this juncture, it is important to borrow from Holmes {1969} on some useful questions, which would be of advantage to the student seeking a problem for investigation. These are as follows: -

1. In your field of interest, what practical problems have to be met by those individuals who do the actual work?

2. In current and recent research, what problems are under active attack?

3. What facts, principles, generalizations, and other findings have resulted from research in your field?

4. What practical implications for schoolwork may be drawn from the results?

5. To what extent have the findings of research actually been applied in your field?

6. What problems remain to be subjected to research and what problems are now emerging?

7. What are the chief difficulties to be met in prosecuting the researches yet to be conducted in your field?

8. What are the inter-relationships between research in your field and research in adjacent fields?

9. What research techniques or procedures have been developed in your field?

10. What concepts have been operative, either explicitly or implicitly, in the research in your field?

11. What assumptions have been implicit or openly avowed in the research in your field?

Personal and Social Factors to Consider in Undertaking a Research

There are other personal and social considerations in the evaluation of a research problem. In doing research, there is the need to ask some basic questions at the onset. According to Akinwumiju (2001) answers to such preliminary questions will act as guides during the actual execution of the study: -

Personal Considerations

1. Is the problem in line with my goal expectations and the expectations of others?

2. Am I genuinely interested in this problem and free from strong biases?

3. Do I possess or can I acquire the necessary skills, abilities and background knowledge to study this problem?

4. Do I have access to the tools, equipment, materials, laboratories and subjects necessary to conduct the investigation?

5. Do I have the time and money to complete it?

6. Can I obtain adequate data?

7. Does the problem meet the scope, significance and topical requirements of the institution or periodical to which I will submit my report?

8. Can I obtain administrative support, guidance and cooperation for the conduct of the study?

Social Considerations

1. Will the solution of this problem advance knowledge in the field appreciably?

2. Will the findings be of practical value to educators, parents, social workers or others?

3. What will be the breadth of the application of the findings in terms of range of individuals, years of applicability and areas of coverage?

4. Will the investigation duplicate the work that has been or is being done adequately by someone else?

5. If this topic has been covered, does it need to be extended beyond its present limits?

6. Is the topic sufficiently limited to permit an exhaustive treatment, yet sufficiently significant to warrant investigating it?

7. Will the conclusions of the study be of doubtful value because the tools and techniques available to conduct the inquiry are not adequately refined and sufficiently reliable?

8. Will the study lead to the development of other investigations?

It is hoped that providing answers to some of these questions will help the student in making a good choice of his research topic. But if he still, cannot find one after this, Aina (2002) suggests the following sources from where he can identify a researchable topic namely: -

1. Practical problems in the immediate environment.

2. Areas suggested for further researches in previously conducted studies.

3. Perusal of dissertation abstracts on one's field of study.

4. Identification of gaps in the literature by going through journal articles, reports etc in one's area of research interest.

5. Research project commissioned by local, national, multi-national companies, non-governmental organizations and international organizations.

Hopefully, the student will, after all these, be able to arrive at a suitable topic such that he is able to define the broad problem that is of interest to him. By and large, it is important to know that there are no hard and fast rules guiding the selection of a suitable research topic. Rather, one can only suggest a few guidelines, as did Osuala (1993) to serve as guidance to the student in selecting a researchable topic.

These include: -

a. That the topic must be of interest to the student.

b. That the topic must be sufficiently original and not duplication.

c. That the topic must be researchable since many problems of philosophical nature could only be discussed but not be researched.

d. That the topic must be significant to the extent that it contributes something new to knowledge in a given field of study.

e. That the topic must be feasible with regards to the availability of data on a given subject-matter

The Processes Involved in a Research Project.

The processes involved in a typical research project have become scientific in nature. This scientific nature of research projects has, in turn, brought about their empirical approach to problem solving rather than speculations. Thus, there are well-defined stages involved in this scientific/empirical approach to research undertakings, which are quite similar to the characteristics of a research project given above. These processes include:

-a. Identification of a Researchable Problem-Although it is expected that the research project should emanate from real-life situations, it is equally important to note that not all real-life situation problems are researchable. There must be a balance between these two.

b. Clear and Concise Statement of the Research Problem: - This is quite important in view of the fact that it is just one thing to be able to identify the researchable problem. It is yet another, quite different thing to be able to put same down very precisely, concisely and clearly. The problem would seize to be researchable until and unless one has been able to state it so well and good as to be precise, concise and clear.

c. Formulating Necessary Research Questions and/or Appropriate Research Hypotheses: - Note **that there is a difference between Research Question and Research Hypotheses**. A research hypothesis is a definite statement whose supposed truth or practicability is testable through the scientific method. It is a form of statement, which declares one's prediction on the subject matter intended to help clarify certain ambiguities/doubts. On the other hand, a research question is an intelligent question posed by the researcher, consequent upon the clear statement of the problem. The research questions are set in such a way that once answers have been provided to them, the research problems in question become resolved. Thus, the research question forms the basis upon which the questions on the research questionnaire, otherwise known as "questionnaire items" are formed.

   Although there are research projects, which have hypotheses and research questions combined, especially at the very advanced stage of research, several other research circumstances required only one of the two.

d. Collecting Required Data for the Research: - Due to the empirical nature of the scientific method of research, data are to be collected on the subject of investigation. Instruments such as questionnaire, personal/direct observation,

interviews and documentary sources are often used for the purpose of data gathering. The instruments are so designed that they seek specific from respondents, which would help in providing needed answers to the research questions and/or providing relevant data for testing the hypotheses. By the term "respondents", we refer to the group of research subjects {people} from whom the researcher intends to collect relevant data for the purpose of his research project. This could be students in a class or group of classes, primary and post-primary institutions, farmers, technicians, medical doctors, engineers, market women, etc. in a particular point in time.

e. Presenting for Analysis and Discussing the Data Collected: - Since the researcher will basically collecting raw data from the field of study, it is expected that such data are presented first, and then subjected to discussions and interpretations. There are so many methods of doing this; depending on such things as: -

i. The type of research in question.
ii. The type of instruments for its data -gathering; and
iii. The types of data collected in the end.

Regardless of all these, however, it is important to note that tabular presentation of data as well as diagrammatic representation in the forms of charts, histograms and frequency tables, are common. For hypotheses testing, the various but relevant statistical methods are employed and are so presented for necessary discussions and interpretations.

f. Drawing Inferences, Conclusions and Recommendations from the Analysis: - This is where the so-much-talked-about contribution(s) to knowledge is made manifest and clearly stated. That is, what the inferences, conclusions and recommendations set out to do; and it is on this basis that generalizations, principles and theories would be derived. Stakeholders are hereby assigned responsibilities with a view to ensuring that the present conditions are improved upon.

The Characteristics of a Research

From the foregoing conceptualizations of the term research, one can safely make the following summary as being the characteristics of a typical research project writing: -

a. That a typical research project must begin on the basis of a problem in mind for which purpose the research sets to resolve. Generally speaking, it is believed that there cannot be a research project in the absence of a problem of interest.

b. That the outcomes/findings of a typical project should help to develop generalizations, principles and theories, which, when applied in other similar situations in the future, could produce the same results. That is, the methods employed to arrive at the results/findings should be reproduce able and yield same results under varying circumstances elsewhere.

c. That the process of conducting the research project must, of necessity, be as systematic and empirical as possible, through the collection of relevant data for the project. This becomes imperative if (b) above must be achieved.

d. To achieve both (b) and (c) above, there is the need for carefully and appropriately selected research plan, otherwise known as design or method, serving as guideline for the research procedures.

e. In the end, the outcomes/findings of the research project should contribute something new to the growth of knowledge in that field of study. Thus, every research project must help to expand further the present frontiers of knowledge.

Criteria of Good Research

Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria:

1. The purpose of the research should be clearly defined and common concepts be used.

2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.

3. The procedural design of the research should be carefully planned to yield results that are as objective as possible.

4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.

5. The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.

6. Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.

7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

In other words, we can state the qualities of a good research as:

1. Good research is systematic: It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well-defined set of rules. Systematic characteristic of the research does not rule out creative thinking but it certainly does reject the use of guessing and intuition in arriving at conclusions.

2. Good research is logical: This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise. In fact, logical reasoning makes research more meaningful in the context of decision making.

3. Good research is empirical: It implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

4. Good research is replicable: This characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

RESEARCH PROPOSAL

The Research Proposal and its Importance

The Research Proposal is an important aspect of project writing. Once a research topic had been chosen, what the project supervisor demands of the student researcher is the writing and presentation of a proposal. This represents a kind of plan, which helps to reveal the intention as well as the understanding the student has about the

chosen topic. It is a sort of insight into how well the student understands the surrounding issues relating to the chosen topic.

The Research Proposal is quite similar to an architectural plan, which gives an insight into what the building will look like on completion. It is in this plan that every conceivable detail about the house to be built is underscored. It is in the same way that the research proposal seeks to highlight the nature, essence and method of carrying out the investigation; a kind of action-plan.

Thus, from the proposal, the researcher gets his focus sharpened; as he deploys his intellects to conceiving the plan of his research from the scratch through to the end. That way, himself and his supervisor have a tremendous gain from the proposal, serving as the foundation of the building. From here, all the perceived structural defects that could so fundamentally affect the construction are corrected once and for all. By so doing, both of them are assured of a solid structure in terms of what comes on the solid foundation afterwards. Indeed, the proposal is a sort of master plan, which helps to guide towards perfection of the conduct of an investigation. It is a kind of summary score- sheet revealing the plans that are involved in carrying out a research work. Thus, Akinwumiju (2000) defines it as "an estimate of what an investigator intends to do, what others have done in the area and how you intend to do your own".

Components of a Research Proposal

Although there is no one generally acceptable standard on what goes into a Research Proposal, the following are considered as critical to any good proposal: -

1. The Project Topic
2. Background to the Study
3. Statement of the Problem
4. Purpose/Objectives of the Study
5. Significance of the Study
6. Scope/Limitation of the Study
7. Literature Review
8. Research Design/Method
9. Population, Sample and Sampling Procedure

10. Data Analysis Procedure.

By the time the student had written on the above sub- headings, he would have formed a convincing idea of what he intends doing and how he intends going about it. At this point in time, he will be able to reconcile his project topic with his objectives; and the methodology to be employed. The exercise would have helped him to understand the possible contributions of his work to knowledge in the chosen area. It will also help to reveal certain shortcomings that may attend to the conduct of the investigation as being proposal. This is because, the discourses under each of the subheadings above brings the student researcher closer to a better understanding, and of course, fuller grasp of the critical and central issues involved the research work. Hence, the desirability, on the one hand; and the justification, on the other; of the project proposal in any given situation.

REVIEW OF RELATED LITERATURE

Introduction

There is no doubt that the literature review is an important aspect of any research project. As its name implies, literature review involves the collation of ideas, views, positions and opinions, expressed in the writings of recognized authorities as well as findings of previous researchers in one's area of investigation {Issa, 2003}. Similarly, Akinwumiju {2000} describes the review of related literature as involving the systematic identification, location and analysis of documents containing information related to the research problem. It aims at providing information about what had already been done; how they were done and with what results.

One of the very early activities in any research investigation is the review of related literature. By this, we refer to the body of research information relating to the present research. All the necessary information needed to put the research in proper context once the research problem has been identified and formulated would derive from the literature review. Until this had been done, the research cannot proceed effectively considering the great amount of information to be sought from a variety of sources-primary and secondary-there is no doubt that the review of related literature is a serious task deserving an equally serious attention. As a result of this, literature review has been considered as "a systematic process that requires careful and perspective reading and attention to detail" {Akinwumiju 2000}.

Thus, its goal is to determine what others have learnt or done aboutsimilar research problems and to gather information relevant to the currentresearch problem. The

Chapter Two of the research project is usually devoted to it. Basically, it serves three purposes namely: -

i. To set the theoretical framework for the research project.

ii. To establish the present research efforts within the mainstream of other related ones previously conducted.

iii. To determine the state-of-the-art in that particular area of study.

How to Determine the Quality of Literature Review

To determine the quality of literature review on any given topic, it is necessary to provide answers to the following questions namely: -

i. How wide {or otherwise} is the scope of the literature reviewed?

ii. How up-to-date are the materials/studies reviewed?

iii. How relevant are the materials reviewed to the subject of the present investigation?

v. How well organized is the entire literature review?

vi. Has it such things as introduction, subheadings, summary and appraisal of reviewed literature?

vii. Is it possible to present a summary of the entire review in a paragraph of few sentences?

The Requirements of a Good Literature Review

To be able to carry out a good work of literature review, one is expected to demonstrate the following abilities namely: -

i. The ability to find relevant sources quickly.

ii. The ability to peruse so many sources quickly.

iii. The ability to identify, for further use, all relevant materials contained in the sources perused.

iv. The ability to interpret and organize information accumulated from the various sources consulted.To this end, Osuala {1993} identified seven (7) specific procedures as the means by which a good literature review can be carried out successfully namely: -

i. Getting a clear picture of the subject under investigation

ii. Orientating oneself toward the empirical research done in the broad area in which the problem lies.

iii. Demonstrating a good ability of reading at a high rate of speed.

iv. Searching for library sources in a systematic and thorough manner.

v. Taking notes systematically in the light of such criteria as uniformity, accuracy and ease of assembly.

vi. Taking as complete notes as he might need.

vii. Recording references on 3x5 cards, each carrying labels of topic or topics.

Opeke {1995} quoting from Casteller and Heisler {1977} enumerated the functions of a good literature review to include the following namely: -

i. To study the history of the problem.

ii. To aid in the selection of investigative procedure i.e. methodology.

iii. To become familiar with the theoretical background of the problem.

iv. To assess the merits of previous studies.

v. To avoid unintended duplication.

vi. To justify the selection of the problem.

By and large, a good literature review enables the researcher to understand previous studies; and to determine the adequacy or otherwise of their design and methodologies and to sharpen his own research focus.

Necessary Preparations for Doing a Good Literature Review

The need to spend time to prepare for a good literature review is borne out of the fact that the initial time spent will save one's time in the long run. Hence, before starting on literature review, you are advised to do the following: -

i. Find out what references are available.

ii. Where and when they could be found.

iii. Get familiar with library sources within your vicinity.

iv. Know the rules and regulations guiding the use of the library.

v. Make a list of key words relating to your research topic so as to guide your literature search.

Guidelines for Carrying out a Good Literature Review

Re-read all notes made during your search exercise so as to refresh your memory and get rid of some works that may no longer seem sufficiently related to your study. The following guidelines would help: -

(i) Make an outline of all the materials you have consulted.

(ii) Examine each of the materials with regards to your outline such as to enable you sort out your references into appropriate piles.

(iii) Take a list of the references identified for a given subheading and examine the relationships and differences between them.

(iv) Ensure that the review flows in such a way that the references that are not too related to the problem are discussed first, and the most related ones come last.

(v) Conclude your review with a brief summary of the literature and its implications for your own study. This is usually referred to as Appraisal of the Literature Review.

Things You Must Not Do When Reviewing Literature

For you to achieve a good review of related literature in your field, you need to take note of the following things when reviewing literature: -(a) Do not be in a hurry to do literature review just to get started in your research project. If you do, then you are more likely to over-look previous studies containing ideas that would have helped to improve your work.

(b) Avoid the temptation to over-depend on secondary sources at the expense of primary sources. Whereas the former refer to materials, which contain account of

events/phenomena by one who was not a witness to them, the latter contain direct accounts of events by the witness.

(c) When reading research articles, avoid the temptation of concentrating on research findings at the expense of valuable information on methods, measures etc.

(d) Avoid being too broad or narrow in your literature search as both have obvious disadvantages

(e) Ensure that the bibliographic data {references} concerning the materials being reviewed are not wrongly copied. Otherwise, it becomes difficult, if not impossible, to locate the materials.

RESEARCH (PROJECT) PROPOSAL WRITING

1.0. INTRODUCTION

1.1. PLANNING THE WRITING OF A RESEARCH PROJECT

- Project-writing is a very serious affair, which deserves seriousness in its prosecution.

- It is a commitment that is largely painstaking; and therefore requires a huge amount of sustainable interest that must survive the entire period of undertaking the project.

What does the researcher plan for?
The student researcher has to **plan for a judicious use of time, efforts and resources that would be at his disposal**. Otherwise, he will end up going to the library to literally "steal" as it were, other students' past projects, copying from them. This does not help!

The justification for planning could also be found in the common cliché that **"if you failed to plan, then you have planned to fail"**.

In planning the writing of the research project, the student researcher is expected to choose a **suitable and researchable project topic.** [This may not be as easy and simple as it sounds. This is because, choosing a topic may turn out to be the student's greatest undoing, which may mar his success; depending on his approach to it.]

1.1.1 Factors influencing the choice of Suitable Research Topic

According to Osuola {1993}, two major factors play a big role in choosing a suitable research topic are experience **and creativity**.

Experience. The student needs to choose a topic about which he **knows something**. After all, one expects, logically that only from **a clear understanding of the theoretical, empirical and practical aspects of the subject, derived from personal experience and a thorough literature review can a good research problem/topic stem**. This is because, once you lack the requisite familiarity with the subject matter, you are almost sure of making a wrong choice afterwards.

Creativity. The second factor, bordering on creativity and other personality attributes are often associated with **originality, flexibility, initiative, ingenuity and foresight** on the part of the researcher. However, all these attributes are expected to operate within the framework of what is already known, just as familiarity with a given field is said to be conducive to original thinking.

1.1.2 Factors to Consider in Choosing a Suitable Research Topic.

The following are some useful questions, borrowed from Holmes {1969} on which would be of advantage to the student seeking a problem for investigation:

1. In your field of interest, what **practical problems** have to be met by those individuals who do the actual work?
2. In current and recent research, what **problems are under active attack**?
3. What **facts, principles, generalisations, and other findings** have resulted from research in your field?
4. What **practical implications** for schoolwork may be drawn from the results?
5. To what **extent** have the findings of research actually been applied in your field?

6. What **problems** remain to be subjected to research and what problems are now emerging?
7. What are the **chief difficulties** to be met in prosecuting the researches yet to be conducted in your field?
8. What are the **inter-relationships** between research in your field and research in adjacent fields?
9. What research **techniques or procedures** have been developed in your field?
10. What **concepts** have been operative, either explicitly or implicitly, in the research in your field?
11. What **assumptions** have been implicit or openly avowed in the research in your field?

1.1.3. Personal and Social Factors to Consider in Undertaking a Research

There are other **personal and social** considerations in the evaluation of a research problem. In doing research, there is the need to ask some basic questions at the onset. According to Akinwumiju (2001) answers to such preliminary questions will act as guides during the actual execution of the study: -

(a) Personal Considerations include:

1. Is the problem in line with my goal **expectations** and the expectations of others?

2. Am I **genuinely interested** in this problem and free from strong biases?

3. Do I possess or can I acquire **the necessary skills, abilities and background knowledge** to study this problem?

4. Do I have **access to the tools, equipment, materials, laboratories and subjects necessary** to conduct the investigation?

5. Do I have the **time and money** to complete it?

6. Can I **obtain adequate data**?

7. Does the problem meet **the scope, significance and topical requirements** of the institution or periodical to which I will submit my report?

8. Can I obtain **administrative support, guidance and cooperation** for the conduct of the study?

(b) Social Considerations include:

1. Will the solution of this problem **advance knowledge** in the field appreciably?
2. Will the findings be of **practical value** to educators, parents, social workers or others?

3. What will be the **breadth of the application** of the findings in terms of range of **individuals**, **years** of applicability and **areas** of coverage?

4. Will the investigation **duplicate** the work that has been or is being done adequately by someone else?

5. If this topic has been covered, does it need to be **extended beyond its present limits**?

6. Is the topic **sufficiently limited** to permit an exhaustive treatment, yet **sufficiently significant** to warrant investigating it?

7. Will the conclusions of the study be of **doubtful value** because the tools and techniques available to conduct the inquiry are not adequately refined and sufficiently reliable?

8. Will the study **lead to the development** of other investigations?

It is hoped that providing answers to some of these questions will help the student in making a good choice of his research topic. But if he still, cannot find one after this, Aina (2002) suggests the following sources from where he can identify a researchable topic namely: -

1. Practical problems in the immediate environment.

2. Areas suggested for further researches in previously conducted studies.

3. Perusal of dissertation abstracts on one's field of study.

4. Identification of gaps in the literature by going through journal articles, reports, etc, in one's area of research interest.

5. Research project commissioned by local, national, multi-national companies, non-governmental organizations and international organizations.

Hopefully, the student will, after all these, be able to arrive at a suitable topic such that he is able to define the broad problem that is of interest to him. By and large, it is important to know that there are **no hard and fast rules guiding the selection of a suitable research topic.** Rather, one can only suggest a few guidelines, as did Osuala (1993) to serve as guidance to the student in selecting a researchable topic. These include: -

a. That the topic must be of interest to the student.

b. That the topic must be sufficiently original and not duplication.

c. That the topic must be researchable since many problems of philosophical nature could only be discussed but not be researched.

d. That the topic must be significant to the extent that it contributes something new to knowledge in a given field of study.

e. That the topic must be feasible with regards to the availability of data on a given subject-matter.

1.2. The Research Proposal and its Importance

The Research Proposal is an important aspect of project writing. Once a **research topic had been chosen**, what is demanded of the student researcher is the **writing and presentation of a proposal**. **This represents a kind of plan, which helps to reveal the intention as well as the understanding the student has about the chosen topic. It is a sort of insight into how well the student understands the surrounding issues relating to the chosen topic.**

The Research Proposal is quite similar to an architectural plan, which gives an insight into what the building will look like on completion. It is in this plan that every conceivable detail about the house to be built is underscored.

Research proposal:

- Seeks to highlight **the nature, essence and method of carrying out the investigation**; a kind of action-plan.
- A sort of master plan, which helps to guide towards perfection of the conduct of an investigation.
- It is a kind of summary score- sheet revealing the plans that are involved in carrying out a research work.
- *Entails the conception of the research problem*

Thus, Akinwumiju (2000) defines it as "**an estimate of what an investigator intends to do, what others have done in the area and how the investigator intends to do his own**"

Thus, from the proposal, the researcher gets his focus sharpened; as he deploys his intellects to conceiving the plan of his research from the scratch through to the end. That way, himself and his supervisor have a tremendous gain from the proposal, serving as the **foundation of the building**. From here, **all the perceived structural defects that could so fundamentally affect the construction are corrected once and for** all.

1.3. Components of a Research Proposal

Although there is no one generally acceptable standard on what goes into a Research Proposal, the following are considered as critical to any good proposal: -

1. The Research/Project Topic
2. Background to the Study
3. Statement of the Problem
4. Purpose/Objectives of the Study
5. Significance of the Study
6. Scope/Limitation of the Study

7. Research Design /Method
8. Population, Sample and Sampling Procedure
9. Data Analysis Procedure.

Note:
By the time the student had written on the above sub-headings, he would have formed a convincing idea of ***what he/she intends doing and how he/she intends going about it****. At this point in time, he will be able to reconcile his project topic with his objectives; and the methodology to be employed. The exercise would have helped him to understand the possible contributions of his work to knowledge in the chosen area. It will also help to reveal certain shortcomings that may attend to the conduct of the investigation as being proposal. This is because, the discourses under each of the subheadings above brings the student researcher closer to* ***a better understanding, and of course, fuller grasp of the critical and central issues involved in the research work****. Hence, the desirability, on the one hand; and the justification, on the other; of the project proposal in any given situation.*

Assignment: Come up individually with a research proposal of your choice in the field of computing and informatics.

2.0. WRITING THE PROJECTS / THESIS PROPER

2.1. Introduction

After necessary amendments of the research proposal by the supervisor, it is expected that the work be certified fit for conduct. It is at this point that the student researcher is asked to commence the full-blown project-writing; starting with the opening chapter. **It is important to state here that a typical research project at this level consists mainly of five chapters, as contained in the following outline**:

-Chapter One
INTRODUCTION
Chapter Two
REVIEW OF RELATED LITERATURE
Chapter Three
RESEARCH METHODOLOGY
Chapter Four
DATA ANALYSIS, INTERPRETATION AND DISCUSSION
Chapter Five
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The outline of Chapter One may include all or some of the following namely: -
CHAPTER ONE
INTRODUCTION
1.1 Background to the Study
1.2 Statement of the Problem
1.3 Research Questions and /or Hypotheses
1.4 Objectives {Purpose} of the Study
1.5 Significance of the Study

1.6 Scope and Limitation of the Study
1.7 Basic Assumptions
1.8 Operational Definition of Terms

As can be seen above, the outline forms a great part of the research proposal and the student researcher only needs to "flesh up" the approved proposal in order to make it up as his Chapter One. It is expected that all the other components as had been written for the proposal would still stand, with the Operational Definition of Terms added to it.

Now, it is important to know and understand what is contained in each of the subheadings in the chapter and these are explained below: -

2.1.2 Background to the Study
As its name implies, this aspect **traces the history of the subject of investigation**; the **emergence of the problem; how he became interested in the problem**. He goes on to **explain the particular circumstances surrounding the problem**, using evidences from the literature to backup various contentions. Here also, he **tries to establish the desirability and feasibility of the study**, judging from the ample evidences drawn from the literature.

In short, this is where the student **researcher introduces the subject of his investigation using all available facts and figures to establish its foundation**. Note that though there is no standard number of pages that this should take, the lengthier and well focused the Background to the Study, the better for a strong and solid foundation for that research being conducted.

2.1.3 Statement of the Problem
The Problem Statement, as it is also called, is **the logical conclusion of the issues raised under the Background to the Study**. The ideal is that while the **Background to the Study provides a broader, or global perspective to the subject matter of the investigation, the Problem Statement makes derivations from there and zero-in on the specifics as they relate to the particular investigation at hand.**
That is why the **Problem Statement is expected to flow, quite logically, from the Background to the Study**; and it is not a good Problem Statement, one that fails in this; since they are not supposed to be two separate entities, as it were. It is however different from Background to the Study in that **it must be stated quite briefly and very clearly**. All the illustrative components of the Background to the Study would have served to enable one go straight for the specifics under the Problem Statement.

{This is why experienced supervisors would insist that the Problem
Statement should be in the range of one to three paragraphs only. The belief is that **the shorter and the clearer the better for the entire investigation process**. In short, one cannot over-emphasize the need to state the problem **very clearly and precisely, since the whole process of the investigation depends on it.**

Durotolu {2001} puts it succinctly when he remarked that "**if the problem is not well defined/stated, the researcher may be working on the wrong issues, may design, develop and**

use inappropriate samples and instruments, and may even engage himself in studying an inconsequential issue".

He advised that **the language here should be definite and quantifiable**; since once this is done, the type of research, the approach and procedures to use are often a matter of simple logical deductions.

Thus, there is no doubt that an **adequate statement of the research problem is the most important part** of a research process. The simple reason for this assertion is that the entire process of investigation hinges on it and it is usually related to some of the following namely:

-i. A missing link
ii. An imbalance
iii. A need
iv. An unsatisfactory state of affairs
v. An unanswered question.

Thus, the Problem Statement gives **direction to the rest of the project; indicating and highlighting the main variables of interest to the researcher as well as the specific relationship between them.**

2.1.4 Research Questions and/or Hypotheses

Usually, these come immediately after the Problem Statement because of their strong relationship. Research Questions are **a form of elaboration/extension of the Problem Statement.** They **do not only seek to convert the declarative statement of the problem into interrogative form, but further break down the main issues compressed in the Problem Statement**.

As its name implies, Research Questions come **in the form of interrogations seeking to establish definite relations among the key variables of investigation.**

Besides, the Research Questions normally serve as **the basis from where the questionnaire items/questions would eventually be derived**.

The difference between the two is that the questionnaire items give a further breakdown of each of the research questions to a greater detail. This is to the extent **that a single research question can produce the range of between three to five questionnaire items/questions**. Whereas the Research **Questions are broad in nature, the questionnaire items are usually directed towards the specifics** thereby getting down to more details.

[*As for the Hypotheses, they are not the same as Research Questions even though they sometimes substitute each other. In other words, it is not uncommon to find projects which have both as well as others which have only one of them. Because they are not the same, they are not expected to duplicate each other. If they stand to do that, then one should be retained and the other disposed of. By this token, one can easily understand that it is not compulsory that a project should have both; especially at the elementary level, where in most cases, the research questions would be enough*].

By definition, a Research **Hypothesis is a clear, definite statement whose authenticity and workability can be subjected to test through the scientific method**. As a declarative statement of prediction**, it seeks to establish the relationship or difference, which exists between one variable and the other(s); and to what extent**. It is a kind of **intelligent guess or assumption usually derived from the outcomes of previous research** and/or **theories emanating from the literature**.

Hypotheses are formulated on the basis of any of the following areas and objectives namely: -
i. To simply describe a phenomenon or a statement of fact
ii. To compare two or more concepts, people and places
iii. To show the relationship between variables
iv. To show a cause/ effect situation between variables.

Generally, there are **two types of hypotheses**; simply referring to the way they are stated:

- **Null:-**is usually stated **in the negative form of No Significant Relationship or No Significant Difference** etc.,

- **The Alternative**:- takes the positive form of statement; such as **There is a Significant Relationship, There is a Significant Difference** etc.

What do research hypotheses do? They

- **Set out the basic issues relating to the data to be gathered** in the course of carrying out the research.
- **Serve as a theoretical conceptualisation of what and how the researcher anticipated in terms of his research outcomes**.
- Assist the researcher to **test and verify his/her ideas** on the basis of which he /she makes very concrete and dependable conclusions and generalizations.
- Also help **him/her to sharpen his/her focus on the research problem with a view to determining the direction where to find the solution**.

Qualities of a good hypothesis

Thus, some of the **qualities of a good hypothesis** as contained **in Durotolu {2001}** include the following: -

i. It should be reasonable {i.e. intelligent guesses}.
ii. It should be consistent with known facts or theories.
iii. It should be stated in such a way that it is testable and found to be probably true or false.
iv. It should be in very simple, unambiguous terms.
v. It should be directly related to the problem of investigation.
vi. It should involve very few variables at a time.
vii. It should be quantifiable {i.e. operationally formulated}.

2.1.5. Objectives {Purpose} of the Study

Just like every other thing in a research project, the Objectives of the Study is closely related to the Research Problem. The former derive directly from the latter. The Objectives of the Study, sometimes referred to as Purpose, represent the **aims of conducting the investigation** and could be categorized into:

i. **Broad (general) objective**
The broad objective states the overall aim of a research project

ii. **Specific objective(s)**
Specific objective is concerned with the detailed list of intentions about what the research stands to achieve at the end of the exercise. Usually, the specific objectives are stated in the form of declarative statements of the research questions. This means that while the Research Questions take the interrogative statement form, the Objectives present the same thing, but in the statement form.

2.1.6. Significance (or Justification) of the Study

It is expected that every research project must have something new to contribute to knowledge in that subject area, however small.

As a matter of fact, **no research should take place if it will not contribute anything to knowledge**; as this represents the hallmark of all research endeavours.

Therefore, this segment is expected to **explain the likely benefits of the research and to whom such expected benefits would be meant**. All these should be clearly stated. In any case, there is no hard and fast rule as to the number of benefits that a research project should have or its length. It can be serialized/itemized or paraphrased depending on the individual's style of writing.

2.1.7. Scope and Limitation of the Study

The **scope** of the study simply refers to **the extent of coverage of the subject matter** being investigated and the proper statement of the problem will serve as a useful guide to doing this. In other words, if the problem had been properly stated at the on-set, it assists, automatically, in defining the scope of the research.
That is why **the scope of the study is partly a function of the title of the research project**. If well formulated, the expression of the title alone does define the scope of the study and perhaps, needs a little rider to make it clearer.

The **limitation** of the study represents the other side of the coin.
Therefore, if the scope was concerned with the extent of the study's coverage, then, limitation means building a fence around the subject of investigation.
This is with a **view to establishing a basis for the non-inclusion of certain things** in the study for obvious reasons.

- To limit one's study is quite essential if the study must be focussed and yield expected results.
- This fence- building exercise helps the study to have and preserve its own identify; thereby helping the researcher to avoid the interference of extraneous, factors, which were not intended to be part of the study from the beginning.

Scope and **Limitation** of the Study are therefore like the two sides of a coin; in that one explains what is included in the study while the other is concerned with what was not intended to be included.

2.1.8. Basic Assumptions

[Although many tend to confuse Assumptions with Hypotheses, it is important to state very categorically that they are not the same. We have already talked about hypotheses; what they mean and their significance in a research project].

Assumptions are just mere statements, which are often, not subjected to any testing. They are, more or less, mere statements that are taken for granted. They cannot take the place of Hypotheses; yet, they tend to duplicate the Hypotheses, because they are quite similar.
It is for these reasons that many have suggested that if the study has hypotheses, then assumptions would no longer be necessary. **For a study with Research Questions only however, it is advisable to have assumptions, to serve as a guide towards the realization of the research objectives**. Assumptions are usually itemized while the number varies.

2.1.9 Operational Definition of Terms

This segment of the Introduction is used to provide a sort of **working definition to all the items**, which would be operationally used in the course of the study. The idea is that there are some terminologies, which have been "adapted" and so used restrictively for the purpose of the research project.
This **means that such terminologies would mean something slightly different from the one adapted under a different situation; hence the name Operational Definition of Terms**.

In defining terms operationally, individual terms/words to be so defined are identified and then itemized. Thus, operational definitions are usually given in such a way that will suggest that they are not the generally accepted or standard definitions but those peculiar to the study in particular. This segment usually comes last in the opening chapter.

2.2 REVIEW OF RELATED LITERATURE

2.2.1 Introduction

There is no doubt that the literature review is an important aspect of any research project. As its name implies, **literature review involves the collation of ideas, views, positions and opinions, expressed in the writings of recognized authorities as well as findings of previous researchers** in one's area of investigation {Issa, 2003}.
Similarly, Akinwumiju {2000} describes **the review of related literature as involving the systematic identification, location and analysis of documents containing information related to the research problem.** It aims at **providing information about what had already been done; how they were done and with what results**.

Note: Review of related literature is one of the very early activities in any research investigation. By this, it is refered to **the body of research information relating to the present research**. All the necessary information needed to put the research in proper context once the research problem has been identified and formulated would derive from the literature review. Until this had been done, the research cannot proceed effectively considering the great amount of information to be sought from a variety of sources-primary and secondary-there is no doubt that **the review of related literature is a serious task deserving an equally serious attention**. As a result of this,

literature review has been considered as "**a systematic process that requires careful and perspective reading and attention to detail**" {Akinwumiju 2000}.

Thus, the **goal of literature review is to determine what others have learnt or done about similar research problems and to gather information relevant to the current research problem.**

The Chapter Two of the research project is usually devoted to it. Basically, it **serves three purposes** namely**: -**

a. **To set the theoretical framework for the research project.**
b. **To establish the present research efforts within the mainstream of other related ones previously conducted.**
c. **To determine the state-of-the-art in that particular area of study.**

2.2.2 How to Determine the Quality of Literature Review

To determine the quality of literature review on any given topic, it is necessary to provide answers to the following questions namely: -

a. How wide {or otherwise} is the scope of the literature reviewed?
b. How up-to-date are the materials/studies reviewed?
c. How relevant are the materials reviewed to the subject of the present investigation?
d. How well organized is the entire literature review?
e. Has it such things as introduction, subheadings, summary and appraisal of reviewed literature?
f. Is it possible to present a summary of the entire review in a paragraph f few sentences?

2.2.3 The Requirements of a Good Literature Review

To be able to carry out a good work of literature review, one is expected to **demonstrate the following abilities** namely:

a. The ability to find relevant sources quickly.
b. The ability to peruse so many sources quickly.
c. The ability to identify, for further use, all relevant materials contained in the sources perused.
d. The ability to interpret and organize information accumulated from the various sources consulted.

To this end, Osuala {1993} identified **seven (7) specific procedures** as the means by which a good literature review can be carried out successfully namely: -

i. Getting a clear picture of the subject under investigation
ii. Orientating oneself toward the empirical research done in the broad area in which the problem lies.
iii. Demonstrating a good ability of reading at a high rate of speed.
iv. Searching for library sources in a systematic and thorough manner.
v. Taking notes systematically in the light of such criteria as uniformity, accuracy and ease of assembly.
vi. Taking as complete notes as he might need.
vii. Recording references on 3x5 cards, each carrying labels of topic or topics.

2.2.4 Functions of a good literature review

Opeke {1995} quoting from Casteller and Heisler {1977} enumerated the functions of a good literature review to include the following namely: -

i. To study the history of the problem.
ii. To aid in the selection of investigative procedure i.e. methodology.
iii. To become familiar with the theoretical background of the problem.
iv. To assess the merits of previous studies.
v. To avoid unintended duplication.
vi. To justify the selection of the problem.

By and large, a good literature review **enables the researcher to understand previous studies; and to determine the adequacy or otherwise of their design and methodologies and to sharpen his own research focus.**

2.2.5 Necessary Preparations for Doing a Good Literature Review

The need to spend time to prepare for a good literature review is borne out of the **fact that the initial time spent will save one's time in the long run**. Hence, before starting on literature review, you are advised to do the following: -

i. Find out what references are available
ii. Where and when they could be found.
iii. Get familiar with library sources within your vicinity.
iv. Know the rules and regulations guiding the use of the library.
v. Make a list of key words relating to your research topic so as to guide your literature search.

2.2.6 Guidelines for Carrying out a Good Literature Review

Re-read all notes made during your search exercise so as to refresh your memory and get rid of some works that may no longer seem sufficiently related to your study. The following guidelines would help: -

i. Make an outline of all the materials you have consulted.
ii. Examine each of the materials with regards to your outline such as to enable you sort out your references into appropriate piles.
iii. Take a list of the references identified for a given subheading and examine the relationships and differences between them.
iv. Ensure that the review **flows in such a way that the references that are not too related to the problem are discussed first, and the most related ones come last**.
v. Conclude your review with a brief summary of the literature and its implications for your own study. This is usually referred to as **Appraisal of the Literature Review**.

2.2.7 Things You Must Not Do When Reviewing Literature

For you to achieve a good review of related literature in your field, you need to take note of the following things when reviewing literature: -

a. Do not be in a hurry to do literature review just to get started in your research project. If you do, then you are more likely to over-look previous studies containing ideas that would have helped to improve your work.

b. Avoid the temptation to over-depend on secondary sources at the expense of primary sources. Whereas the **former refer to materials, which contain account of events/phenomena by one who was not a witness to them, the latter contain direct accounts of events by the witness.**

c. When reading research articles, avoid the temptation of concentrating on research findings at the expense of valuable information on methods, measures etc.

d. Avoid being too broad or narrow in your literature search as both have obvious disadvantages

e. Ensure that the bibliographic data {references} concerning the materials being reviewed are not wrongly copied. Otherwise, it becomes difficult, if not impossible, to locate the materials.

3.0 RESEARCH METHODOLOGY

3.1 Introduction

Research methodology ***is a way to systematically solve the research problem****. It may be understood as* ***a science of studying how research is done scientifically****. In it we study the various steps* that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology.

Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques***, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.***

Researchers also need to understand ***the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not.*** All this means that it is necessary for the researcher to ***design his methodology for his problem as the same may differ from problem to problem***. {For example, an architect, who designs a building, has to consciously evaluate the basis of his decisions, i.e., he has to evaluate why and on what basis he selects particular size, number and location of doors, windows and ventilators, uses particular materials and not others and the like}. Similarly, in research the ***scientist has to expose the research decisions to evaluation before they are implemented. He has to specify very clearly and precisely what decisions he selects and why he selects them so that they can be evaluated by others also.***

3.2. The Use of Statistics in Data Analysis

Sulaiman {1997} defined the term **statistics as "a branch of applied mathematics, which is employed in analysis of data to facilitate meaningful decision making**." It is also described as **the theory and methods of analysis obtained from samples of observation in order to compare data from different empirical observations using hypothesized relationships in order to make meaningful decisions.**

It should be noted that even then, **the methods of data analysis depend on the aims and objectives of the study and the nature of the data gathered**. It becomes clear from the above, that **statistical analysis could be useful for**: -

i. Reducing quantities of data to manageable and understandable form.
ii. Aiding decision making
iii. Summarizing samples from which they are calculated
iv. Aiding reliable references and decisions from hypothesis

Statistics thus **serves as a tool used in collecting, organizing, analysing and interpreting data**. Generally speaking, statistical methods are categorized into broad classes: **Descriptive and Inferential Statistics**.

Descriptive Statistics are often used **to summarise** the data collected, while **Inferential Statistics** are used **to determine the generalizability of findings** arrived at, through the analysis of a sample, to the larger population.

Note that **Descriptive Statistics can be used for both sample and population data but cannot be used to perform inferential tests on population data**. This is because the results obtained from descriptive analysis are definitive enough for the population of interest. The application of either Descriptive or Inferential statistics to a set of data largely depends on the levels or scales of measurement of underlying variables. In all, there are four (4) levels of measurement otherwise known as **scale**. These are: -

i. Nominal Scale.
ii. Ordinal Scale.
iii. Interval Scale.
iv. Ratio Scale.

3.2.1 Nominal Scale

This is considered as the **simplest and the least refined** scale of measurement; one whose primary use is to provide a **labelling function**. A good example of this is the individual's sex, which can be either male or female. There cannot be any other thing between these two. The Yes or No kinds of questions are also good examples of this. However, it **lacks the property of order and magnitude**.

3.2.2 Ordinal Scale

This kind of measurement also performs the **labelling function apart from its ordering function**. This is because it **possesses the property of order and magnitude such that two things could be compared in terms of their relative magnitude**. A good example of the Ordinal Scale relates to the degree of agreement with a statement such as Strongly Agree, Agree, Disagree, and Strongly

Disagree. Using this scale to measure two units, one will be able to determine which is higher or lower and not just that they are not the same.

3.2.3 Interval Scale

This also has **the property of order, magnitude and additivity** since equal intervals on the scale represent that there is a difference with a magnitude. The scale does not posses absolute zero because the zero is arbitrarily set. In addition to its ordering function, this scale can be used to determine the difference between two units. Measuring the temperature of a room in Celsius and Fahrenheit is a good example of this scale.

3.2.4 Ratio Scale

This scale is **the highest level of measurement because it has an absolute zero**. As a general rule, whatever statistical methods are applicable to variable measured in the nominal scale can be applied to those measured in ordinal and interval/ratio scales. Similarly, those statistical methods applicable to variables measured in ordinal scale can also be applied to those measured in interval/ratio. There are, however, statistical methods that are applicable to variables measured in interval/ratio that could not be applied to variables measured in the nominal scale. Some examples of **the ratio scale include weight, time and speed**; thus possessing all the properties of the other scales.

3.3. Procedure and Tools for Data Analysis

In data analysis, there are procedures and tools to be employed depending on the type of research as well as the nature of the data to be analysed. Regardless of the instruments/methods used in data collection, and whether the data is from sample or population, **the first step in data analysis is to describe the collected data.**

To do this, however, the data should be summarized either using **a frequency table or chart**. **These two are veritable tools for presenting and communicating data** in such writings as technical reports and journal articles.

3.3.1 The Frequency Table

There is no doubt that with the Frequency Table, the researcher can display the **number of cases, which have each of the attributes of a given variable**. It also serves to display both qualitative **and quantitative data.**

When confronted with the number of attributes or categories of **a variable that is too large**, the Frequency Table adopts **the grouped data approach** by combining the attributes into classes. For example with Age as a variable, the Frequency Table may present data as: -

20-24
25-29
30-34
35-39
40-44

3.3.2 The Charts

Just like the Frequency Tables, there are also Charts, which serve similar purposes. The two most commonly used Charts are the Pie **and Bar** Charts. That is, both could be used to present data

summaries and also used to **interpret and convey the message more quickly, concisely and clearly than frequency tables**.

Their great **limitation** however lies in the fact that they hardly **cope in situations where the attributes of a variable to display are too many,** especially when these are more than nine. This is particularly so for Pie Charts which are quite useful in providing vivid picture of data but only in showing the distribution of variables with single responses. Thus, **they are inappropriate tools for variables associated with multiple responses from the units of the study.**

Also, while they are most applicable for qualitative data, Pie Charts also serve to display quantitative data particularly those whose number of attributes or categories is not more than five. As for the Bar Charts, they serve for qualitative data in particular, irrespective of the nature of the responses to the variables, either single or multiple. Since Bar Charts make it easier to compare the categories of a variable, they are more suitable for displaying data with more than five categories. They also serve to display quantitative data, particularly, the variable presented in a discrete fashion. However, **Histogram remains the more appropriate tool for displaying continuous variables.**

3.3 Measures of Central Tendency

This is another approach to describing a set of data, considered useful in determining a typical attribute/value of a variable. The measure is also useful in comparing the performances of two or more groups or the performance of a group over two or more periods of time. The **Mean, Mode and Median** are the three most common Measures of Central Tendency.

The Mean:- is the arithmetic average of a set of data usually applicable to quantitative data. To obtain the Mean, sum up all the scores in a set of data to be divided by the number of scores. With the distribution of the variable that is skewed, however, the Median will better represent the distribution, as extreme values tend to increase or decrease the Mean.

The Median:- is considered as the middle value in a set of data when all the values are arranged in order of magnitude. In other words, **the Median tends to show the grouping together of scores around a central point, dividing a set of data into two main parts**. In short, **the middle scores between the upper half and the lower half is the Median.** Although the Median is most appropriate for Ordinal Data, it is also applicable to Ordinal, Interval and Ratio Data.

The Mode: - Meanwhile, the score, which has the largest frequency in a set of data, is referred to as the Mode. It refers to **the most common attributes or value of a variable in which case it is possible for a set of data to have more than one Mode**. Although most appropriate for Nominal Data, the Mode is also applicable to all types of data.

Measures of Variability: - This is also known as the **Measures of Dispersion** in which a measure of variation or dispersion is calculated primarily to determine the **homogeneity** of a set of data. There are separate measures of variation for qualitative and quantitative data. For quantitative data, measures of variation include: -

i. The Range
ii. Standard Deviation

iii. Variance or the Square of the Standard Deviation
iv. Coefficient of Variation

The Range:-This refers to the **difference between the highest and lowest attribute or value**. Its primary objective is to give the researcher an **idea of the data spread** to determine the range for a grouped data, minus the highest limit from the lowest limit. Thus, the range is **solely based on the two extreme values and fails to recognize how the data are actually distributed** between these two values. Hence, the desirability of Standard Deviation to offset this inadequacy.

Standard Deviation: - is **the distance or the average deviation** of all values from the Mean. The difference between each Score and the Mean is the Deviation Scores from the Mean. The bigger the Deviation, the more variable the set of Scores. The Standard Deviation is obtained by taking the **square of the average of these deviations and divided by the number of Scores**. Thus, it is an indication of the typical deviation of the values from the Mean. **If the Standard Deviation is small, the group is considered homogeneous whereas a large Standard Deviation is an indication of a heterogeneous group.**

Variance: - refers simply to the square of the Standard Deviation, obtained by subtracting each observation from the Mean (x), squaring the resulting difference (Xi - X) to eliminate negative signs of Deviation. They are added up to give the Sum of Squares (Xi-X) and finally dividing it by the number of observation 'n'.

Coefficient of Variation: - This is the Ratio of a distribution's Standard Deviation expressed to its Mean, multiplied by 100, and is independent of the unit of measurement. Coefficient of Variation is employed when comparing the Variability of two sets of data particularly when they are expressed in different units of measurement.

Statistical Hypothesis Testing
Unlike the general discussion on hypotheses as earlier on presented, the topic is being re-visited here (under data analysis), with particular reference to Inferential Statistics. By Inferential Statistics, we refer **to drawing conclusions regarding the Population of the Study based on the information obtained from the Sample**. It means that this kind of Statistics will not be relevant in situations such as when one is working with Population Data and when one is not interested in making a general statement about the Population.

At the centre of Inferential Statistics is the concept of Hypothesis Testing. This refers to the process whereby the research **infers from a sample whether or not to accept a statement** about the Population; where the statement itself is the Hypothesis. Hypotheses are stated either in the Null or Alternative forms for the researcher to validate; even though that the Null Hypothesis remains the more commonly used of the two. As a matter of fact, it is always the Null Hypothesis that gets tested and it is mainly on the condition that it is rejected that one can accept the Alternative Hypotheses.

When testing Hypotheses, the **maximum probability with which one may be willing to reject the Null Hypothesis** is referred to as the **Level of Significance**. It is common practice to use an alpha level of 0.05 or 0.01; meaning that there are 5 or 1 of 100 chances of committing Type 1

Error. When the Reject Decision has been made at 0.05 level, it means that the outcome of the experiment is statistically significant at the 0.05% level.

The procedure, which enables one to decide whether to Reject or Accept Hypotheses or to determine whether observed Samples differ significantly from expected results is differently referred to as **Test of Significance, Rules of Decision, or Test of Hypothesis**. Thus, if against the assumption that a particular hypothesis is true, we find results observed in a random sample differ markedly from those under the hypothesis, we then conclude that the difference is Significant. On this basis, we can reject the Null Hypothesis. Errors are sometimes made in Hypothesis testing and these have been categorized into: -

i. Type 1 Error
In a situation where we Reject the Hypothesis when, in fact, we should Accept it, it is said that we have committed a Type 1 Error of decision or judgment.

ii. Type 11 Error
On the other hand, if we accept the Null Hypothesis when we should, indeed, reject it, we are said to have committed Type 11 Error. Such errors usually lead to wrong decisions.

To have a good Test of Hypothesis, there must a **design** to minimise these errors of decision. A sure way of doing this is to **increase our sample size, since the larger the Sample Size, the less the possible errors**. Some of the several kinds of Inferential Tests often employed in the analyses of data include: -

i. T- Test
ii. Analysis of Variance
iii. Chi-Square
iv. Correlation and Regression Analyses

T-Test: - This is normally used to compare the Means of two groups of data; which means that the data being compared should be quantitative. These two groups of data may be for two independent samples or may be for the same sample with the data collected at two different periods {i.e. paired samples}. If, based on the observed p-value, it is decided that the two groups are different, then, one should be able to state which group has the larger Mean.

P values. The *P value* or calculated probability is the estimated probability of rejecting the null hypothesis (H0) of a study question when that hypothesis is true.

Analysis of Variance

This Test, commonly referred to as ANOVA, is normally used to **examine the effects of qualitative independent variables on a quantitative dependent variable**. The One-way ANOVA is its simplest form and is used for comparing the Means for several groups. If, in the end, the Null Hypothesis is Accepted, it indicates that the Means for all the groups are the same. On the other hand, a Rejected Null Hypothesis indicates that not all the Means are the same even as it does not mean that they are all different. To ascertain which pairs of means are different, it becomes necessary to conduct a **multipl**e comparison test.

Chi-Square

This kind of Test is often used to determine the existence of a relationship between two qualitative variables. Before applying the Test at all, a Contingency Table {Cross-tabulation} is usually formed to study the patterns of frequencies in the Table. If, at the end, the Null Hypothesis is Rejected, it means that there is a relationship between the two variables. It is after this that measures are used to determine the strength of the relationship.

Correlation and Regression Analyses: - used to study existing relationship among quantitative variables; and especially that between two quantitative variables. In particular, **Correlation Analysis measures the strength of the relationship between the two variables**, while the **Regression Analysis develops an equation that enables one to predict the value of the Dependent Variable for different values of the Independent Variable**.

These two methods are commonly used either as Descriptive or Inferential procedures. As a Descriptive procedure, **a Correlation Coefficient is calculated to determine the strength of relationship between two variables.**
As an Inferential procedure, Correlation Analysis **determines whether the observed correlation between the variables as determined from the sample can be generalized on the population**.

The procedure requires that the p-value is calculated and used to Accept or Reject the Null Hypothesis. If the Null Hypothesis is accepted {i.e. there is no correlation between the two variables in the population}, there is no need to obtain a Regression Equation, as it cannot be used to predict the value of the dependent variable.

{Chi-square is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis. For example, if, according to Mendel's laws, you expected 10 of 20 offspring from across to be male and the actual observed number was 8 males, then you might want to know about the "goodness to fit" between the observed and expected. Were the deviations (differences between observed and expected) the result of chance, or were they due to other factors. How much deviation can occur before you, the investigator, must conclude that something other than chance is at work, causing the observed to differ from the expected? The chi-square test is always testing what scientists call the **null hypothesis,** which states that there is no significant difference between the expected and observed result.

4. DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The chapter sets out on an introductory note often referred to as "**Preamble**" where the researcher provides useful background information on the respondents' group (s), their characteristics with respect to their bio-data and the rate of returns of the data gathering instruments.

The researcher then moves on to **the main theme of his/her research by presenting necessary data in the form (s) considered most appropriate for the purpose of analysis**. Note that the **researcher should organize the raw data collected from the respondents and present them in a compact** form as **in their raw forms, it is quite difficult to present and analyze data**. This

can be done by subjecting the data to **tabulation, grouping or even graphic forms**, so as to allow for easy handling and analysis of the collected data.

If, for example, **the tabular mode of data presentation is used, the tables should be well titled; each followed by detailed explanation on the data presented. This pattern should be used for each of the tables presented**.

Also important under data analysis is the **Discussion of Results segment**. This comes up, normally, after the entire presentation exercise had been concluded. It **is the segment where the researcher gives a more detailed insight into the issues directly relating to the data presentation and analysis**. The segment helps to articulate the issues emanating from the data analysis with respect to whatever implications they have on the subject of investigation.

If the study is concerned with hypotheses testing, it is in this segment that the implications of the outcomes of the tests as they relate to the subject of research would be explained.

It is here, where **conclusions on the relationship of the outcomes of the present study with previous ones are drawn; with a view to establishing a link between the outcomes of the present study and those of previous studies as already established under the literature review**. Furthermore, the researcher dedicates a part of this segment to interpretation of the outcomes of his findings, thereby giving more meaning and sense to the data analysis exercise.

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The presentation of a summary of the study's findings comes up, usually in Chapter Five, which is the last in the series.

Its purpose is to provide an outline of **the main and essential findings of the study devoid of the details already presented** in Chapter Four.

It opens on an introductory note; explaining this purpose in very clear terms.
Its outline usually includes the following: -

- 5.1 Introduction.
- 5.2 Summary of the Findings.
- 5.3 Conclusions
- 5.4 Recommendations
- 5.5. Suggested Areas for Further Studies.

Summary of the Findings

A good presentation of the Discussion of Results in Chapter Four is of great essence and use to achieving a focussed Summary of the Findings. There is indeed a direct relationship between that

segment of Chapter Four and the Summary of the Findings; **as the former provides a good outlay of what will go into the latter**.
Thus, Summary of the Findings is to be written in such a way as to provide answer or the results of hypotheses testing (as found by the study), to all the research questions and/or hypotheses; both of which must have been stated in the beginning or introductory chapter. It **represents the main essence of what the researcher had done and found as a result of his/her investigations**. This is usually presented in the form of itemization or listing; with each item corresponding to a research question, hypothesis or both, as the case may be.

Conclusions
The Conclusions are supposed to be a direct fall–out of the Summary of the Findings. This is to the extent that some even believe that conclusions are simply an extension of Summary of the Findings; since they derived from there.
Whereas some set out their Conclusions in items form (i.e. numbering or itemizing them), as is the case with Summary of the Findings, many others present them in paragraph form. Whichever the case may be, one important thing to bear in mind is that **Conclusions must not be made outside of the context** (i.e. the main findings) of the study at hand. In other words, the Conclusions **should be solely and directly drawn from the subject of investigation** and even more importantly, **the study's major findings**. In essence, the Conclusions of a study could be described simply as **the researcher's understanding of the Implications of the study's findings.**

Recommendations
This is also directly linked with both the summary of the findings and the conclusions already treated above. Precisely, **recommendations** are meant to **serve as suggestions on how to improve the present state of affairs as revealed by the study's findings**. The recommendations are expected to address **salient (**prominent or conspicuous**) issues**, which might have been raised in the course of the investigation, hence, they should target the relevant segments of the society with a view to improving upon the existing practices in that particular area of study.

Ogunniyi {2001} provides a guide as on what this segment focuses to include: -

- **i.** The group of people or individual that was studied.
- **ii.** The relations or family members concerned.
- **iii.** The organization in which the project was conducted.
- **iv.** Professionals in the field of focus of the research.
- **v.** Other educationists and educational planners.
- **vi.** Future researchers.
- **vii.** Concerned leaders and interested individuals.

He states further that in making recommendations, it is important to clearly state the following:

- **i.** What is responsible for a state of affairs?
- **ii.** How to achieve the desired states?
- **iii.** What should be avoided?
- **iv.** What should be rectified?
- **v.** Who should play a particular role?
- **vi.** How to improve a situation?

vii. The resources needed?
viii. How to initiate something?
ix. How to eradicate the undesirables?

Suggested Areas for Further Studies

While some research projects conclude on recommendatory note as discussed above, there are others, which come further to Suggestions for Further Studies. This segment is devoted to suggesting related and follow-up studies, which interested future researchers can consider. This is with a view to filling the gaps, which the present study left unattended to, as a result of its own limitations.

SOME ISSUES IN TECHNICAL PAPER WRITING

I. BIBLIOGRAPHIC CITATIONS AND REFERENCING STYLES

Introduction Project and other forms of research report writings are largely technical in nature as had been explained and demonstrated in the preceding chapters. Parts of what constitutes this technicality could be found in **the way citations and references are made. No project or any other research reports for that matter, can be written independent of what others have done previously on that subject.**

After all, researchers are expected **to build on previous efforts of others**; to such an extent that what had been done in that area becomes **the starting point for the present study**. It was in reference to these previous efforts that the issue of **bibliographic citation and referencing** became very relevant and important.

1.1 Bibliographic Citations

At the centre of literature review lies **the critical issue of using and referring to previous efforts** in what area; what their areas of interest were, how they carried out their studies; what the outcomes were and so on. As much as it is permissible to refer, as it were, to these previous studies, **research ethics demand that such referred works are duly acknowledged in the present work**.

When such an **acknowledgment is done in the body of the writing, it is referred to as Citation since what was done is citing their works**. **For every work thus cited, full bibliographic details must be provided on it at the end of the work**. For the typical project work, there are options as to where the references are located; the **first** being to supply them, as they occur, at the end of each chapter. By such an arrangement, the work is expected to have five different sets of References - a set each to a chapter. **The second option** is to combine everything at the end of the entire report while the **third** is a combination of the two; in which case they are supplied at the end of the chapter, where they featured, while a bibliography is provided at the end of the work.

Meanwhile, there is just **a little difference between References and Bibliography** such that many tend to confuse the two. Whereas the term **References** refers to a **list of works** used in the course of carrying out a **particular research**, **Bibliography** includes these as well as **other works**, which in the judgement of the author have indirect benefits to the present effort. Thus, Bibliography is intended to draw attention to **other related materials**, not directly used in the present work, but

considered to be of **immense importance** to other researchers who may be interested in related studies in the future.

- **Citation** - indicating in the body of a piece of work that some material is not entirely original, by providing a short 'identifier' for its source (here called a **reference in the text)**.
-
- **List of reference** - listing, in a separate section of the work, the full details of the source.

By and large, the idea of Bibliographic Citations and Referencing has become one of a great significance in research works as well as in other technical writings generally. Their importance is central to Literature Review in a research as well as to the entire study. **They enable researchers to acknowledge the materials, information, ideas, opinions, theories and others' findings,** which had been consulted in the course of the present study.

By so doing, **the individual researcher frees himself/herself from the widely acknowledged, unethical and criminal practice in research popularly known as plagiarism. This is an offence bordering on copyright infringements where a researcher fails to acknowledge the intellectual properties of others he/she had used in the course of his/her own study**.
Thus, **using others' intellectual properties is not the offence** here; rather, it is **the lack of acknowledging the fact that what was used actually belongs to others**. The act of referencing simply provides for this much-desired acknowledgment. This applies not only in project writing but in all cases of technical reporting and writings; such that it forms a part of the criteria for **judging the quality** of such works; hence, its significance.

Styles of Referencing
There is no doubt that several forms and styles of referencing are in existence; all taking their roots from the age-long and traditional form being the **footnote**. According to Adeniyi {2001}, the choice of a particular style is often published in recognised literature or texts; some of which include are: -
1. Campbell, W.E. & S.V. Ballon {1974}. Form and styles of writing Theses. Research Reports and Term papers.

2. Strunfied, W. & E.B. White {1962}. The Elements of Styles.
3. The Modern Language Association Styles {MLA}
4. Turabian, R.L. {1987}. A Manual for Writers of Term Papers, Theses and Dissertations.
5. The Publication Manual of American Psychological Association {APA}

Each of the sources listed above provides ample information regarding the Styles of Referencing as favoured by the authors or associations responsible for their creation. A general assessment of these formats reveals that a broad categorization into **two main classes** is possible. These classes are: -

1. The Traditional or Classic Format {i.e. The Numbering or Footnote}
2. The Author/Date Format {i.e. The APA Styles}.

The Traditional or Classic Format

This referencing format had survived from the early civilization and scholarship. Great authors and writings of the ancient, the medieval and renaissance have heavily employed the use of this format; a typical example of which is the **Footnote**. **Footnoting** is quite similar to the modern day Numbering format; since both employ the use of numbers, though in slightly differing ways. Such classical writing as those of William Shakespeare and other literary giants of the early times **used the avenue of the footnotes not for referencing purpose only but also for explaining the difficult aspects of such works as they relate to the individual pages of their works**. This is because the citations are to be found at the bottom of the pages where they occur following the pattern of the numbers assigned them in the body of the work. **The primary advantage of their use is that of convenience** since the reader finds those information contained in the footnotes **readily available on the same page**. Thus, the footnote serves as a **ruing (**lamenting**) reference**; hence it's traditional or classical nature. This form of referencing has the distinctive nature of employing a great deal of Latin abbreviations such as: -

i. Ibid {Ibidem} to denote same place as a previously cited work.
ii. Op. cit {Opere citato} to denote that the citation is in the work cited; and it is quite similar to Ibid.
iii. {id est} to denote 'that is'
iv. Loc. cit {loco citato} to denote 'the place cited'.

Apparently, this form of referencing employs the numbering styles whereby numbers assigned the citations the text correspond with the order in which, they appear under references.

The Author/Date Format

This **contrasts with the one above as a modern format of referencing and the most widely adopted at present.** Overtime, this format has been closely associated with the specification of the America Psychological Association Style of Referencing.

Adeniyi {2001} states that this format takes its root in 1929 when it was published in Psychological Bulletin of the American Psychological Association to serve as a guide to authors in the preparation of their manuscripts. This is the product of the Association's recommendation on the standard procedure to which reference might be made in case of doubt. Since 1929, when first published, several revisions of the work came out in 1944, 1952 and 1974; thereby gaining wider acceptance. Since then, every edition had aimed at aiding authors in the preparation of manuscripts.

Abdulkareem {1980} attributed the wider acceptability enjoyed by this format today to its **simplicity, clarity, conciseness, objectivity and ease of understanding**. It is not surprising therefore to find the format being used in virtually all areas of knowledge, especially with regards to all forms of technical report writing.

How to Cite Within the Body of the Work (In Context)

Using the APA Styles of Referencing, there are certain specifications, which seek to ensure **standard and uniformity**. First among these is the author/date order of citation. Here, the author's surname is provided while the publication date/year appear in parentheses, which follows immediately. Issa {2007}, where the author's surname forms a part of the sentences or narrations, is a typical example. But when the author's surname does not form a part of either of these, both the name and the year are contained in the parentheses, separated with a comma. E.g. {Issa, 2007}

In this case, both do not form a part of the sentences or narrative; as they come normally at the end of it.

Rules Guiding the Use of Quotation Marks

In using others' works, it may involve paraphrasing or summarising the ideas or opinions expressed therein in one's own words. It is also common to find writers quoting directly (verbatim/word for word) from the source (s); Here also, there are rules guiding the use of any of these. For instance, direct quotations which contained statements that are more than 50 words, or more than three typewritten lines must be indented. This requires no use of the quotation marks; as in the example below: -

Example 1

In his contribution on the nature of reference materials, Kolawole {2003} remarks: -

> General reference materials are broad in scope and contain a variety of information oftentimes unrelated. The topics are only related by a common mode of arrangement. Reference materials cannot be borrowed for use out of the library except by some special arrangement. Reference books have been planned and written to be consulted for items of information, rather than to be read from cover to cover.

Whenever this type of direct long quotations are made, it is important to note that typing is done in single line spacing while the margins on both sides are clearly shown. Note also that the citation i.e. Kolawole {2003} in the example above, may follow immediately after the quotation whereby, both the name and date would appear in parenthesis (Kolawole, 2003}. However, quotations containing fewer than 50 words or lesser than 3 typewritten lines need not be indented since such quotations would run along in the body of the work. A way to distinguish such quotations, especially when they are of the direct form, is by the use of Quotation Marks ("..."). Where quotes appear within quotations, single quotation marks ('…') are used to set out one from the other, as illustrated below: -Example 1

In his discussion on the types of research, Aina {2001} states: "there are two main types of research. These are 'basic' or 'pure' as well as 'applied' research".

Rules Guiding the Use of Ellipsis/Dots

Another important element of this form of citation is the use of three dots/ellipsis points {…} which may come either at the beginning, in the middle or at the end of the quotation; each having its own significance. This is illustrated in the examples below: -Examples

i. If the dots appear at the beginning of the statement, this means other statement(s) had preceded the portion being quoted with the quotation mark extending out to its beginning. E.g. "… and affirmed that is it good to be good".

ii. If the dots appear at the middle of the statement, it means other statements, not considered to be of relevance to the issue at hand, have been omitted. This is usually done at the discretion of the author and it may come up at any point within the quoted sentence (s). E.g. "Considering the ever-dwindling state of our economy, high rate of unemployment, illiteracy level…, one cannot but conclude that the nation is presently in a sorry state".

iii. If at the end, it means that there are other statements in the quotation, which the writer did not deem fit to be included in his work for reason(s) best known to him. E.g. "Considering the ever-dwindling state of our economy high rate of unemployment and illiteracy level, one cannot but conclude that the nation is presently in a sorry state…"

Note that only three dots are used for these purposes and not more or less; as anything outside of this will be against the rule.

Citing Inaccurate Quotations

When using direct quotations, accuracy of quotes must be ensured; to the extent that words misused or mis-spelt must appear as contained in the source(s) being quoted. To show that you have taken note of the mistake, and prevent confusion on the part of the reader, the Latin word 'sic' is written in a bracket and then underlined right in front of the mis-spelt or misused word. Thus, the {sic} sign is used to indicate that you are aware of the mistake contained in the quotations thereby drawing readers' attention to it.

Example 1

Arising from the findings of a study, Lawal {2003} concludes, "All stakeholders' hands must be on deck to solve the problem ones {sic} and for all".

Example 2

One cannot but be surprised to hear constructions such as: -

i."Since the day I am {sic} born".

ii."I prefer yam than {sic} rice", coming from students in tertiary institutions today.

Citing Works of Two Authors

If a citation is the product of two authors, **both surnames should appear with the date**; following the usual patterns such as indicated in the following example: -Kolawole and Issa {2003} or {Kolawole and Issa, 2003} depending on the location of citation in the text.

Citing Works of Six Authors

Where the authors **are more than two, but not more than six, all of them must be cited as at when and where they first appeared in the text while subsequent citations take cognisance of only the first named author followed by et. al**, before the date.

Examples

i. When cited for the first time, it takes this form:

Olaoye, Kolawole, Issa and Ango, {2003} or
{Olaoye, Kolawole, Issa and Ango, 2003}

ii. When cited subsequently, it takes this form:

Olaoye et. al. {2003} or
{Olaoye et. al., 2003}

Citing Works of Corporate Authorship

The same rule applies in corporate authorships, involving organizations, government and non-governmental agencies, corporations associations, and other unions. This is particularly so for such corporate authorships whose names are too long. In this case, the names would be fully written

only at the first instance in the body of the text and then abbreviated in subsequent instances. If they are not too long, however, they may be repeated in their full forms.

Example 1

i. When first cited: -
United Nations Educational, Scientific and Cultural Organization (2000)

ii. When subsequently cited: -
UNESCO {2000} or {UNESCO, 2000}.

Example 2

i. When first cited: -
National Council on Privatisation and Commerce (2003)

ii. When subsequently cited: -
NCPC {2003} or {NCPC, 2003}

Example 3

i. When first cited: -
National Agricultural Production Research Institute {2002}

ii. When subsequently cited: -
NAPRI {2002} or {NAPRI, 2002}

Citing Several Works of an Author

When citing **several works of an author**, which have been used in the present work, **the dates/years of publication are the main distinguishing factors**. Regardless of how they had occurred in the body of the work, they are distinguished in the portion under References by their years of publication, which should be in chronological order as in the examples below:

Salman, A.A. {1986}
Salman, A.A. {2000}
Salman, A.A. {2003}

The chronological arrangement as shown above is the determining factor when writing out the Reference; regardless of how they occurred in the body of the work. This is similar to the arrangement of such works in the way they were cited in the text, as is in this example: - {Salman, 1986, 2000, 2003} or Salman {1986, 2000, and 2003}.

An important point to note here is that such works, **though written by the same author, are of differing contents.** They are only considered together in **view of a common idea that might have run through them;** which is the reason for citing them.

Citing Works Published in the Same Year

Similar to the above is a situation whereby **two or more works are published in the same year either by the same or more authors.** The guarding rule is that such works be **arranged in the order of alphabets a, b, c, d etc., to be written in front of the years of publication**.

Example 1

Olanrewaju {2002a, 2002b, 2002c, 2002d} or {Olanrewaju, 2002a, 2002b, 2002c, 2002d}

Example 2
Ifabiyi and Olanipekun {1999a, 1999b, 1999c, 1999d} or {Ifabiyi and Olanipekun, 1999a, 1999b, 1999c, 1999d}

Citing Anonymous Sources
If the work has no author; as in the case of some newspaper/magazine writings and other classical, anonymous writings, the title becomes the issue in focus (Access Point).

Example 1
In one of its editorial columns, the **Tribute** {2004} made a passionate appeal to the Federal Government to reconsider its current embargo on employment.

Example 2
In one of its recent issues **Tell** {2004} took a critical look at the current spate of insecurity across the land.

Citing Internet Sources
As for citing sources from the Internet, it does not differ significantly from the others, especially when the authors name is provided. Where this does not exist, however, {as is the case sometimes}, the site address from where the information was provided becomes the reference point.

Example 1
In his own contribution to the discourse on what the essential components of information are, **Sukovieff (2004)** states that "…"

REFERENCES
Abdulkareem, A. Y. (1980) "Selecting a Research Topic". In Jimoh, S. A. Research Methodology in Education: An Interdisciplinary Approach. Ilorin: University of Ilorin Library and Publication Committee. Pp. 87-92.

Adeniyi, J.A. {2001} "Citation and Referencing". In Adegboye A.O. {ed} Research Project Report: A Practical Guide. Ilorin: Kola Success Project. Pp. 103-123.

****Assignment (search for an article and/or a project report, thesis or dissertation in computing and informatics - preferably from IEEE, Association for Computing Machinery (ACM) sites. ****

CHAPTER SEVEN
HOW TO REFERENCE WORKS ALREADY CITED IN THE BODY OF THE WORK
Introduction
What was done in the last chapter was to explain **the various methods of citation in the body of the work.** The other side of this is the way the references are made at the end of the work. It is important to note that the citations in context must correspond with the reference list. Often times, references are listed; some of which are not traced in the body of the work. When this happens, either of two things is possible. The first possibility is that the author has read so wide in his area of interest and intends to draw attention to some relevant works he had consulted but not used directly in his work. In this case, the appropriate thing to do is to have another separate heading

after the References to be titled **Bibliography**. In the alternative, the items may be filed together and titled as **References and Bibliography**.

The second possibility is **undesirable**; as it is not only **unethical but also dubious**. This is a situation where the **writer fails outrightly to indicate the sources of materials used in the body of the work as expected**; only for a list of items to appear latter under references at the end of the work. When this happens, the first impression that one gets is that the author lacks an understanding of what references are and their significance in standard writings. Otherwise, he would have known that it is simply fraudulent to use others' works/ideas only to make it look as if they are his. At any rate, this practice **exposes the intellectual bankruptcy of the individual** writer who engages in such a practice. Sad enough, this is prevalent among lecturers who turn **lecture notes into conference papers** in such a great hurry that they miss out on the objectives of such writings. The practice is, to say the least, quite unwholesome as it is condemnable. Also significant to mention at this juncture, is that **little difference exists between the referencing methods commonly used for textbooks and those of other technical writings as projects, theses, dissertation, conference, and seminar papers etc.** The reasons for this slight difference are two namely: -that **there are no generally accepted specifications for referencing books, as there are for other technical writings**. Book authors are therefore at liberty to adopt any method of their choice. Secondly, is the fact that many authors have been found using **the numbering style of the traditional or classical referencing format**? This has no rigid stipulations regarding certain basic elements that References must contain. On the other hand **the author/date method, which is the hallmark of the APA Style** has **become uniform, clear, consistent and widely adopted in the academic world generally**. Its popularity among intellectuals the world over is simply unequalled. This may be partly due to its **academic origin (American Psychological Association} and perhaps, due to its currency as a result of its constant updating through regular revisions.**

Today, there is the latest specification on the APA Referencing Style. Although this so- called new APA style contains only a slight variation from what used to be obtained, it remains a remarkable effort in its principle of constant updating for currency. This, in itself, is commendable; and probably explains, in part, the much of a wider acceptability that the style presently enjoys. On this strength, therefore, the new APA style shall be used as our guide in discussing how to reference works, which have been already cited the body of the text.

The New APA Style of Referencing

The works cited in the body of the text usually come from a variety of information formats, such as books, journals, magazines, newspapers and in recent time, the Internet. For each of these formats, there are set guidelines to be followed. The essential elements of this new style can be broadly categorized into four (4) namely: -

a) The Author Component
b) The Date Component
c) The Title Component
d) The Imprint Component

The Author Component

The author's surname, separated by a comma, together with the fullest of the remaining names or the initials, as the case may be, are hereby given. Titles like Dr. Mrs. Prof. Alh. Rev. etc. are totally disregarded. The first letter of the surname should be capitalized. All the authors' names, regardless of their number, must be provided here and ensuring that a full stop (.) comes after each of the initials, except where the full names have been provided.
Example 1
Olaoye, J.O.

Example 2
Arinola, S.A.

The Date Component
Immediately following the author's name is the year of publication, generally referred to as date. It is the year in which the work was produced or published. Usually, they are enclosed in parentheses in front of the author names.
Example
Olaoye J .O. (2002)
In some rare situations, there are works without publication dates. Where this is the case, the letters n **.d. (no date),** are given in parentheses instead.
Example
Aliyu, M.B. (n. d).

The Title Component
The fullest form of the title of the work being referenced is hereby given; providing both the main and sub titles, wherever applicable. In referencing titles of works, slight variations exist, which serve to distinguish between textbook titles, book chapters from those of journal articles and newspaper/magazine reports. Textbook titles are set out in a way that the first letters of both the title and the subtitle as well as those of other proper names (if there are) are capitalized. The general rule, which applies here, is that all book titles, once written as explained above, are underlined. However, some textbook referencing had their book titles written in italics in substitution for this common practice. If the work has an edition other than the first, then the edition statement is provided immediately after the title.

Example
Madu, E .C. (2004) Technology for Information Management and
Services. (2nd ed.).

For a work, which is a chapter of an edited work, the author's name and initials come first, followed by the date and then the title. After these, the word In is used to introduce the editor's identity as well as the title of the edited work. Unlike the author's name, which will be inverted, the editor's name is not but will be followed by the word (Ed.) or (Eds.) as the case may be, in parentheses.
Example
Olorunyomi, G.F. {2003} "The Nature and Use of Serials". In A. A. Kolawole & A.O. Issa {Eds.} Library and Information Science: An Introductory Text.

Some important things to note in the example above include: -

i. That the author of the book chapter in question comes up first and is inverted.

ii. That the title of the book chapter comes next after the date (in parentheses). This title of the book chapter is in quotation marks/ inverted commas.

iii. There is a full stop (.) immediately after the chapter title

iv. The word "In" introduces the editor, whose name is not inverted. It is however followed by the letters (Eds.) in parenthesis.

v. The title of the edited book is underlined.

The Imprint Component

The term **imprint** refers to **bibliographic information such as the place and year of publication as well as the name of the publisher in respect of a particular book or even non-book material**. The imprint component of the reference therefore refers to this group of information, which also include the **pagination**. The following is the order of their presentation: -

Place of Publication

This comes immediately after the title, where there is no edition statement. Where there is, then, the edition statement precedes it. Usually, the first listed name is chosen except where there is another, which is more recognized than it.

Examples
2nd ed. Lagos:
3rd ed. Kaduna:
4th ed. Ilorin:

Name of Publisher

This follows the place of publication with the colon sign (:) in between them.
Examples
2nd ed. Lagos: University of Lagos Press.
3rd ed. Kaduna: Northern Publishing Co.
4 th ed. Ilorin: Wunmi Commercial Press.

Page Location

This comes last to indicate the exact location of the information cited. Where it points to specifics, only a particular page number, which contained that information, is indicated.
Example
P. 13.
Note that **the letter 'p' is capitalized and followed by a full stop (.) to show that it is an abbreviation, while the number in itself is written in figure and not in words.** If the cited work **covers a number of pages, as it is usually the case with journal articles, two letters 'p' would be used. In this case, the first appears in capital and the second in small case followed by a full stop (.)**
Example

Pp. 14-24.

Examples of References
In the end, a full citation is provided for the work in our example as follows: -

Edited Work
Olorunyomi, G.F. {2003} "The Nature and Use of Serials". In A.A. Kolawole & A.O.Issa {Eds.} Library and Information Science: An Introductory Text. 2nd ed. Lagos: University of Lagos Press. Pp. 42-59.

Unedited Work
Aliyu, M.B. {2002} A Beginner's Text on Librarianship. Offa: Wunmi Commercial Press. P.8. Joint Authorship.

Olanipekun, S.A & O.J. Ifabiyi {2003} Library and Information Science: An Introductory Text. Offa Dee Root. P. 10.

Seminar/Conference Paper
AbdulKadir, O. L. (2004) "Social Mobilization through the Broadcast Media for National Integration and Development". A paper presented at the 1 st National Conference of the School of General Studies held at the Federal Polytechnic, Offa. 23rd_25thMarch. P. 4.

Journal Paper
Oyinloye, A .M. (1998) The Internet: Challenges for Academic Libraries in Nigeria. Focus on International and Comparative Librarianship. 29 (3). Pp. 146-151.

Newspaper \ Magazine (With Author)
Jibade, O.M. (1996) "Presidential Primaries: The Rigging Game". Tell, 34. August 24. P.11-13

Without Author
"Presidential Primaries: The Rigging Game": Tell, 34. Aug. 24. P. 11 -13.

Internet Resource
Sukovieff, H. M. (2004) an Investigation of Influences on Career Decisions of High School Graduates: A Follow-Up Study. SSTA Research Centre Report. Retrieved Apr.10, 2005 from http://www.ssta.sk.ca/students/90-04.htm

CHAPTER EIGHT
GUIDELINES FOR PREPARING THE FINAL COPY OF THE PROJECT

Introduction
It is assumed in this chapter that the required five (5) chapters of the project had been well written by the student and thoroughly supervised by the supervisor.

The Preliminary Pages

The preliminary pages consist of the following: -
The Full Title Page
The Approval or Certification Page
The Dedication Page
The Acknowledgement Page
Abstract Page
Table of Content Page

The Full Title Page
This is the page on which the following information are usually found: -

a. The main title of the work and the subtitle {if any}.
b. The complete names of the student {s} as the case may be.
c. A follow-up statement describing the research project, the department to which it is being submitted and the purpose of the submission.
d. The name of the institution to which it is being submitted. The month and year of publication

The Approval or Certification Page
As its name implies**, Approval/Certification Page expresses statements confirming the fact that the work had been properly supervised and approved; having met the standard requirements of the department and of course, the institution.** Below these statements are the following provisions namely: -

a. A space for the supervisor's name and a corresponding space for the date.
b. A space for the head of department's name and a corresponding space for the date.
c. A space for the student's name and a corresponding space for the date.

The Dedication Page
The student researcher writes his/her dedication on this page. Usually, this comes in a few lines of sentences to form a single paragraph. If one must go strictly by the dictionary understanding of the **word 'dedicate', which means "to set apart for a holy purpose", the dedication page was to be devoted mainly to God, the Almighty. Thus, the page is supposed to be "solemn" in its contents and be God-focused.** So, the practice has been **to begin this page with the expression of one's indebtedness to God, first and foremost.**

The Acknowledgement Page
Usually, **this is lengthier than the dedication as it allows for all forms of comments regarding the roles played by every significant contributor to the successful completion of the project work.** Although the Dedication Page is supposed to be the "holy page", as it were, where God is focused, it remains logical that **the Acknowledgement Page also begins on the note of the praiseworthiness of God Almighty. The researcher's parents (whether dead or alive), relations, supervisor, colleagues and friends as well as the typist, should all have a place in the acknowledgement.** This is to the extent that all these have contributed in one way or the other to the successful completion of the project. There is no limit to the number of pages that this must contain even though an average of one to two pages is hereby recommended so that it can retain its focus.

Abstract Page

This is also an important aspect of the preliminaries. **It is at providing a summary of the entire project work.** This is from the perspective of its dictionary meaning **implying "a shortened form of a statement, speech etc."** {Quirk, 1978}. This definition only gives a basic understanding of what abstract is, from a general perspective, which will not serve the required purpose for writing an abstract in a project work or even conference.

Forms of Abstract Writing

Abstract Writing in Projects/Theses/Dissertations

In a more professional sense, the term abstract connotes a short account of something much longer such that only the salient issues contained are brought to the fore. It is a sort of synopsis. Unlike the summary, the synopsis aims at certain specifics, which in the case of project/thesis/dissertation writing will include the following briefs namely: -

i. The problem statement
ii. The study's main objective
iii. The main justification for the conduct of the study
iv. The research methodology; highlighting the population, sample, sampling technique, data collection instruments and their administration as well as the data analysis methods and procedures
v. The study's main findings.
vi. The conclusion(s) drawn from the study's main findings.
vii. The highlight of the recommendations made.

Abstract Writing in Conferences, Seminars and Journal Paper

This differs from those of projects, theses and dissertations in a number of ways, some of which are as follows: -

i. It is much shorter in length, usually of about 50 words.
ii. It has no paragraphs since only one paragraph is required.
iii. It should provide an over-view of the work's contents by compressing the problem statement and/or study objectives; the main thrust of the work; its main findings, conclusion(s) and recommendations into the paragraph.
iv. It must be on a separate page.
v. The paper's title and/or the author's name must not be repeated on this page or elsewhere in the work.
vi. The abstract should be written in single line spacing while the word "ABSTRACT" should be aligned to the center on this page.
vii. Quotations are not entertained in this segment.

The followings are examples of the two categories of abstract writing:-

Example 1 (Project, Thesis and Dissertation)

Below is a sample Abstract of a project titled: -

THE EFFECTS OF USER EDUCATION ON LIBRARY USE AT THE YABA COLLEGE OF TECHNOLOGY LIBRARY

This research work sets out to investigate User Education and its Effects on Library Use at the Yaba College of Technology Library. It has been observed that the major problem confronting academic libraries is the ability of the students to make effective use of the library. This is usually associated with academic performance of the students in these institutions, which negates the aims and objectives for which the academic libraries, were set up in the first place. This justifies the imperativeness for conducting a research on the effects of user education on library use at the Yaba College of Technology Library. In order to conduct the study therefore, a survey research design was adopted; using questionnaire and interview as the major instruments for collection exercise and was completed by personal observation. Tables and percentage were used for data presentation thereby enabling for easy discussion and interpretation of data. At the end of the data gathering exercise, the study revealed that although user education exists at the College Library, user experience certain difficulties. Some of these include inability to use the subject catalogue to locate materials on the shelves and ignorance as to where to go during visits to the library which is on account of the fact that some students and lecturer s do not handle the use of library course seriously by having the mentality that it is not a departmental course, teaching the course without practical, using difficult approach to teach the course and not given proper information about the course. Thus, the study concluded that unseriousness in handling the use of library course by some of the Students and Lecturers could go a long way in hampering effective User Education programme provision necessary for assisting the users in making effective use of the library. Finally, appropriate recommendations are put forward for solving the present situations as revealed by the study. Some of these include students' adopting a changed attitude towards the course, thereby, taking the course on library use more seriously, lecturers teaching the course with practical demonstrations, making the approach simple and ensuring the provision of information on the course.

Table of Content Page

These are the last of the preliminary pages and usually run into more pages than one. **The content pages are set out in such a way that to its left hand side, the contents are outlined beginning with the preliminary pages themselves running through the entire chapters. Corresponding to each of the content item listed will be the page numbers beginning with the roman numerals of the preliminary pages through to the Arabic numbers of the main pages of the five chapters.** Also, each of **the main and sub-headings carry some designated numbers corresponding to the chapter number to the inner left-hand margin.**

To illustrate a typical format of the preliminary pages discussed in the preceding pages of this chapter, an hypothetical sample will be provided in the following pages: -

THE EFFECTS OF USER EDUCATION ON LIBRARY USE AT THE YABA COLLEGE OF TECHNOLOGY LIBRARY

BY OKOOBOH ONOJASIKE ELIZABETH LI/HND/FO4/014

SUBMITTED TO THE DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE, SCHOOL OF COMMUNICATION AND INFORMATION TECHNOLOGY, FEDERAL POLYTECHNIC, OFFA, KWARA STATE

IN PARTIAL FULFILMENT FOR THE AWARD OF HIGHER NATIONAL DIPLOMA (HND) IN LIBRARY AND INFORMATION SCIENCE

DECEMBER, 2006.

APPROVAL PAGE

This project work has been read and approved as meeting the requirement of the Department of Library and Information Science, Federal Polytechnic Offa, in partial fulfillment of the requirement for the award of Higher National Diploma (HND) in Library and Information Science.

…… ……..

Dr. A.O. Issa Date

(Project Supervisor)

……. ……

O.E. Okooboh Date

(Researcher)

…… …….

J. O. Olaoye Date

(HOD)

DEDICATION

This research project is dedicated to Almighty God who moulded me right from my mother's womb and by whose divine assistance made it easy for me to accomplish this work.

ACKNOWLEDGEMENT

I am most grateful to the Almighty God for the successful completion of my Higher National Diploma Programme and also for His provision, protection and guidance over me and every member of my family. My profound thanks go to my project supervisor, Dr. A.O. Issa whose assistance, guidance and criticism made this work a success. My sincere thanks go to my parent Mr. and Mrs. J.E. Okooboh for their encouragement, care guardian and financial support right from my childhood up to this very moment of my life. No amount of expression can describe enough their wonderful support and care shown to me. Also deserving my appreciation are my brothers and sisters, Iziegbe, Omonoh, Eliabhi, Itua and the entire member of my family. The place and role played by Engineer Chukwuma Osemeke deserve a special mention here. He was involved in the process of gathering information for this research work. He is also the one who provided all the copies of questionnaires that was used to collect data for this research. I am grateful to him for this.

I would like to specially thank Mrs. S. A. Ukaigwe, Mrs. R. N. Iyiegbuniwe and the entire staff of the University of Lagos Library for the assistance and support provided in the course of collecting relevant data for the purpose of this research. I would also like to thank the entire staff of the Yaba College of Technology Library especially Miss. Gloria Elonye, the Circulation Librarian who assisted me in administering the questionnaire used for the collection of data for this research. Not least deserving my gratitude are my friends, Mr. Donald, Mr. Daniel Jeremiah, Barister Mayowa, Engineer Patrick Ekuozor, Kola Ayoola, Anthony Alagbile, Ifeoma Nwobodo, Cynthia Samuel, Lawal Adenike, Ademola Bunmi, Bakare Tayo, Leo Omolakin and the entire member of the

Nigeria Federation of Catholic Students. I will not also forget the entire members of the 2005/2006 sessions, Library and Information Science Department.

TABLE OF CONTENTS

ABSTRACT
This research work investigates User Education and its Effects on Library Use at the Yaba College of Technology Library. It has been observed that the major problem confronting academic libraries is the ability of the students to make effective use of the library. This is usually associated with academic performance of the students in these institutions, which negates the aims and objectives for which the academic libraries, were set up in the first place. This justifies the imperativeness for conducting a research on the effects of user education on library use at the Yaba College of Technology Library. In order to conduct the study therefore, a survey research design was adopted; using questionnaire and interview as the major instruments for collection exercise and was completed by personal observation. Tables and percentage were used for data presentation thereby enabling for easy discussion and interpretation of data. At the end of the data gathering exercise, the study revealed that although user education exists at the College Library, user experience certain difficulties. Some of these include inability to use the subject catalogue to locate materials on the shelves and ignorance as to where to go during visits to the library which is on account of the fact that some students and lecturers do not handle the use of library course seriously by having the mentality that it is not a departmental course, teaching the course without practical, using difficult approach to teach the course and not given proper information about the course. Thus, the study concluded that unserious ness in handling the use of library course by some of the Students and Lecturers could go a long way in hampering effective User Education programme provision necessary for assisting the users in making effective use of the library. Finally, appropriate recommendations are put forward for solving the present situations as revealed by the study. Some of these include students' adopting a changed attitude towards the course, thereby, taking the course on library use more seriously, lecturers teaching the course with practical demonstrations, making the approach simple and ensuring the provision of information on the course.

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